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REPORT ON THE BEET SUGAR INDUSTRY IN THE UNITED STATES

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ON

THE BEET SUGAR INDUSTRY IN THE UNITED STATES

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CONTENTS.

Page.

Letter of submittal IX

CHAPTER I.—INTRODUCTION.

Section 1. Purpose and scope of the investigation 1
Section 2. Some peculiar characteristics of the beet-sugar industry 2
Short operating period 2
Effort required to secure beets 6
Section 3. Development and progress of the beet-sugar industry in the United States 6
Building of beet-sugar factories in the United States since 1889 7
Location of beet-sugar factories in 1914 11
Growth of production 11
Section 4. Governmental encouragement of the industry 13
Encouragement through Federal tariff legislation 13
Encouragement through State legislation 14
Idaho 14
Kansas 14
Iowa 14
Minnesota 15
Michigan 15
Nebraska 15
New York 15
The effect of tariffs and bounties on the industry 16
Section 5. Consumption of sugar in continental United States 16
Percentage of consumption supplied by domestic beet-sugar factories 18

CHAPTER II.—BEET GROWING.

I. YIELD AND QUALITY OF BEETS IN THE UNITED STATES.

Section 1. Introduction 20
Section 2. Yield of sugar beets per acre 21
Section 3. Quality of beets 22
Percentage of sugar in beets 22
Purity of beets 23
Sugar extraction 24
Summary of yield and quality of beets 25
Section 4. Experimental results in beet growing 28

II. COST AND PROFITS OF BEET GROWING.

Section 5. Methods employed in securing data 28
Difficulties due to lack of records 29
Section 6. Representativeness and reliability of data 30
Representativeness of the information secured 30
Reliability of data 31

Page.
Section 7. Classifying and tabulating data 32
Section 8. Cost and profits of individual growers in 1913 34
Section 9. Average cost and profits of individual growers for three years 47
Relation of profits to yield 56
Average results by districts 57
Section 10. Profits from beets compared with profits from other crops 58

CHAPTER III.—COST OF PRODUCING BEET SUGAR.

Section 1. Introduction 61
Costs cover only the sugar manufacturing business 62
Bases of cost computations 62
Identity of factory concealed 62
Section 2. Proportion of total production covered by cost tables 62
Section 3. Details of elements of cost 63
Details of certain cost items 64
Interest excluded from cost 65
Section 4. Depreciation 65
Method of arriving at a depreciation charge 66
Cost of plant investment 67
Rate of depreciation 68
Section 5. Average cost of production for five years, by factories 69
Relation of various cost items to the total factory cost 75
Relation of cost of beets to cost of sugar 76
Cost, including depreciation 79
Section 6. Average cost of production for five years, by States 79
Effect of by-products on net cost 81
Pulp 82
Molasses 83
Unusually high costs for some factories in 1911–12 83
Section 7. Average costs by groups of factories 85
Section 8. Comparative cost of production for all factories, by years 86
Section 9. Cost of sugar manufactured per ton of beets 87

CHAPTER IV.—DISTRIBUTION OF SUGAR.

Section 1. Introduction 92
Section 2. Where beet sugar is consumed 92
Section 3. Cost of distribution 94
Freight charges 100
Other expenses 100
Net prices received 102
When beet sugar is sold 103

CHAPTER V.—INVESTMENT, CAPITALIZATION, AND EARNINGS OF BEET-SUGAR COMPANIES.

Section 1. Investment and capitalization 123
Comparison of cost of investment with capital liabilities 123
Section 2. Relations of earnings to capital employed 127
Earnings in the sugar business 128
Section 3. Rates of earnings on capital employed 129
Rates of earnings by groups of companies 132
Section 4. Rates of earnings on net investment 133

CHAPTER VI.—EFFICIENCY IN THE BEET-SUGAR INDUSTRY.

Page.
Section 1. Principal elements to consider in studying efficiency..... 135
Mechanical elements..... 135
Economic elements to be considered..... 136
Difficulties in a comparative study of efficiency in beet-sugar factories.... 136
Section 2. Comparisons based on scale of operations..... 137
Section 3. Important economic advantage of favorable location..... 141
Location with respect to the supply of beets..... 141
Advantage of proximity to markets..... 145
Section 4. Comparisons based on factory equipment..... 146
Steffens process..... 147
Pulp driers..... 149
Section 5. Conclusions..... 151

CHAPTER VII.—RELATIONS BETWEEN SUGAR MANUFACTURERS AND BEET GROWERS.

Section 1. Interdependence of the two interests..... 152
Section 2. Contract prices for beets..... 153
Contracts in 1913 and 1914..... 154
Contracts in 1915..... 160
Apparent inconsistencies in contracts..... 161
Section 3. The test of a fair price for beets..... 163
The reasonableness of basing the price of beets upon the price of sugar.... 164

LIST OF TABLES.

Page.

1.—Days of operation, by factories and by States, campaigns of 1909–10 to 1913–14, inclusive..... 3
2.—Annual production of beet sugar in the United States from 1889–90 to 1914–15, inclusive..... 12
3.—Consumption of sugar in continental United States, 1865–1914..... 17
4.—Percentage of the total consumption of sugar in the United States produced from domestic cane and beets, 1899 to 1914, inclusive..... 18
5.—Average yield of sugar beets per acre in the United States, by States, 1904 to 1914, inclusive..... 21
6.—Average sugar in beets used in the United States, by States, 1904 to 1914..... 23
7.—Average purity coefficient of beets used in the United States, by States, 1904 to 1914..... 24
8.—Average extraction of sugar per ton of beets used in the United States, by States, 1904 to 1914..... 25
9.—Acreage harvested, average yield per acre, average sugar content and purity of beets, and average extraction, by States, 1904–1914..... 26
10.—Acreage harvested, average yield per acre, average sugar content and purity of beets, and average extraction, for the United States, 1904–1914..... 27
11.—Costs and profits of growing beets in the United States, by farms grouped by districts, 1913..... 34
12.—Costs and profits of beet growing, by farms and by districts; averages for the three years 1911, 1912, and 1913..... 49
13.—Average costs and profits, by districts, for the three years 1911, 1912, and 1913..... 57
14.—Cost of producing 100 pounds of granulated sugar, by factories; averages for the five years 1909–10 to 1913–14, inclusive..... 72
15.—Relation of certain cost items to net factory cost, for the five-year period 1909–1913, by factories..... 76
16.—Comparison of cost of beets with gross cost of sugar, not including depreciation; averages for the five years 1909–10 to 1913–14, inclusive..... 77
17.—Comparison of cost of beets with net cost of sugar, not including depreciation; average for the five years 1909–10 to 1913–14, inclusive..... 78
18.—Average cost of producing 100 pounds of granulated sugar, by States, for the five years 1909–10 to 1913–14..... 80
19.—Average net value of by-products per 100 pounds of sugar produced, by States, for five years ending 1913–14..... 82
20.—Comparison of average net cost, not including depreciation, of producing 100 pounds of sugar in Michigan, Ohio, and Wisconsin for the five years ending with 1913–14, the year 1911–12, and for four years excluding 1911–12..... 84

Page.

21.—Average net cost per 100 pounds of sugar, and the percentage of the total sugar produced during the five years ending with the campaign of 1913–14, for 64 factories, grouped according to the net cost of production..... 85

22.—Average sugar extraction per ton of beets and average cost of the manufacture of sugar per ton of beets sliced by factories, for the five years 1909–1913..... 88

23.—Beet sugar sold by 24 companies in the various States for the year 1912 and 29 companies in 1913..... 92

24.—Gross receipts per 100 pounds of beet sugar, selling expense, and net price at factory per 100 pounds, by companies, for the years 1909–10 to 1913–14, inclusive..... 95

25.—Percentage of total sales of beet sugar made in each month, by years and by States of production, 1910–11 to 1913–14..... 103

26.—Excess of Detroit, Denver, and San Francisco quotations for granulated sugar (beet) over New York quotations (cane), weekly, 1913 and 1914.. 106

27.—Quotations of raw sugar and refined granulated sugar at New York, and margin between raw and refined, by weeks, 1890 to 1914..... 108

28.—Percentage of overcapitalization or undercapitalization of beet-sugar companies at the end of the years 1909–10 and 1913–14..... 124

29.—Rates of earnings on capital employed, taking account of depreciation, in the manufacture of beet sugar, allowing one-half of the total cost of production for working capital, by years, and averages for five years, 1909–10 to 1913–14, inclusive..... 130

30.—Annual rates of earnings from sugar on net investment in the sugar business, by companies, 1909–10 to 1913–14, and the average annual rate of earnings for the five years..... 133

31.—Average cost per 100 pounds of sugar produced by groups, for the year 1913–14..... 139

32.—Comparison of the average cost of beets and the net cost of production, not including depreciation, during the five-year period 1909–1913, by factories, grouped according to the amount of sugar extracted per ton of beets sliced..... 142

33.—Comparison of the average prices received for beet sugar, the cost of selling and the net price received at the factory per 100 pounds, for the five-year period 1909–1913, by States..... 145

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The Commission desires to mention as especially contributing to the preparation of this report Mr. T. M. Robertson and Mr. H. L. Anderson, who assisted Mr. Robertson.

LETTER OF SUBMITTAL.

THE FEDERAL TRADE COMMISSION,
Washington, May 24, 1917.

To the Congress:

There is submitted herewith a report on conditions in the beet-sugar industry in the United States. The investigation was begun by the Commissioner of Corporations at the direction of the Secretary of Commerce because of complaints on the part of farmers that they were not receiving a fair price for beets.

The report deals chiefly with the costs and profits of growing sugar beets, the cost of manufacturing and marketing beet sugar, the profits in the manufacture and sale of beet sugar, and the relations between sugar-beet growers and beet-sugar manufacturers. It covers in detail the operations of all the beet-sugar factories in the United States, except two small ones, during the five-year period ending with the business year of 1913–14.

Because of the lack of funds to prosecute work other than that specifically directed by Congress, this report has been delayed, much to the regret of the Commission. It would have been desirable to bring the information down to a later date, but such a course was not possible because of the lack of an available force.

A discussion of the economic position of the industry is not included in the report because it involves the consideration of matters strictly within the province of another governmental agency. A chapter dealing with this subject has been prepared and it, together with all the data collected during this investigation, has been turned over to the United States Tariff Commission.

In 1914, 700,000 tons of beet sugar was produced in the United States in 78 factories. The four principal centers of production were Michigan and northern Ohio, Colorado, northern Utah and southern Idaho, and California, but 12 other States contributed to the total production. Michigan and Colorado each had 16 factories in 1914, California had 13, Utah 7, Idaho and Ohio 5 each, and Wisconsin 4. There were 10 States that had only 1 factory each. California and Colorado produced more than 50 per cent of the total production of the country during the five years covered by the report. The annual

consumption of sugar in the United States is approximately 4,300,000 tons, and about 16 per cent of this was produced in domestic beet-sugar factories in 1913–14.

GROWTH OF THE INDUSTRY.

There were only 3 beet-sugar factories in operation in the United States in 1870, and this number had increased to only 9 by 1897, but in 1914, as already stated, there were 78. The production has increased from less than 45,000 tons in 1897 to more than 700,000 tons in 1914.

The rapid development of the industry after 1897 has been largely due to direct encouragement by the Federal and State Governments, particularly the former. While customs tariffs have afforded a large measure of protection to the industry since 1883, it was not until after the tariff act of 1897 that the rapid development of the industry began. In 1897 Michigan enacted a State bounty law which greatly stimulated the building of factories in that State. Soon afterwards other States enacted similar laws, but they were all, including those of Michigan, soon repealed or declared unconstitutional.

COST OF PRODUCING BEET SUGAR.

The average cost for 64 factories producing 96 per cent of all the beet sugar in the United States during the five years ending with the season 1913–14 was $3.74 per 100 pounds, including depreciation, which for these factories averaged 25 cents. The average cost of 36 factories producing 74 per cent of the sugar was $3.46; the average for 26 factories producing 57 per cent of the sugar was $3.36. On the other hand, 21 factories producing 15 per cent of the sugar had an average cost of $4.84. There was a wide range of cost in different factories. The lowest average cost for any factory for the five-year period, including depreciation, was $2.94 and the highest was $6.45 per 100 pounds. Speaking broadly, this wide variation was due mainly to differences in the cost of beets per 100 pounds of sugar, but there were also wide differences in the cost of manufacture. The average cost of beets per 100 pounds of sugar for these 64 factories during the five-year period ranged from $1.64 to $4.48, while the additional cost of production, including overhead expenses but not including depreciation, ranged from 44 cents to $2.44. In general, high cost of beets is accompanied by high cost of sugar.

There was also a notably wide variation in average costs in different States. The lowest average cost for the five-year period, including depreciation, was $3.27 per 100 pounds in California, and omitting the States that had only one factory each the highest average

cost was $4.88 in Wisconsin. The average cost of beets in California for the five-year period was only $2.05 per 100 pounds of sugar, while in Wisconsin it was $3.50.

EARNINGS IN THE BEET-SUGAR BUSINESS.

With respect to earnings the report covers 37 companies, operating 77 factories, that produced nearly 99 per cent of all the beet sugar manufactured in the United States during the five years ending with the season 1913–14. During this period these companies earned in the sugar manufacturing business an average of 11 per cent on the capital employed therein. The average earnings of all the companies by years ranged from 16 per cent in 1909–10 to 3 per cent in 1913–14. In no other year, except 1913–14, were the average earnings as low as 8½ per cent. The extremely low earnings in the year 1913–14 were due to the unusually low prices of sugar.

Some companies operated at a loss during most of the period, while others made very large profits. Thus, the operations of 29 companies producing 95 per cent of all the beet sugar manufactured in the United States during the five-year period showed average results varying from a loss of nearly 18 per cent to gains of nearly 45 per cent. Thirteen companies producing 75 per cent of all the beet sugar in the United States had average earnings of more than 9 per cent on the capital employed in the business, and 7 companies producing 53 per cent of the sugar earned on the average over 16 per cent. On the other hand, 16 companies that earned an average of less than 5 per cent produced 13½ per cent of the sugar, and 9 companies operating at an average loss produced only 9½ per cent of the sugar.

Upon the whole, capital employed in the beet-sugar business earned very fair returns during the period.

BEET GROWING.

The cost of growing and selling sugar beets and the gross return from their sale were secured from a number of representative growers in every locality where beet sugar is manufactured. There was found a wide range of results varying from actual losses to large profits. The expense of growing and marketing beets is very high. It was found to range from a little less than $35 to more than $50 per acre. The gross returns, however, were correspondingly high. The average annual returns in the various beet-sugar districts for a period of three years ending with 1913 ranged from about $60 to more than $75 per acre, and the average net profit per acre ranged from less than $20 to about $40. The highest net profits per acre were found in California, Colorado, and Utah. The lowest net profits in any district of considerable size were in Michigan. In

three California districts the net profits ranged from $38 to $45 per acre; in Colorado the range was from $27 to $37; in Utah the range was from $25 to $37, while in Michigan it was only $17 per acre.

Comparing the net profits of beet growing with those from other branches of agriculture, it appears probable that no other important standard crop would year after year yield better net returns per acre than beets. Many farmers, however, insist with apparent reason that they are entitled to a better return on beets than on most other crops. This is because of the unusual care and diligence required to grow them as compared with general field crops, and because of the usually large outlay of cash for labor.

With respect to the complaint of the farmer that he does not receive a fair price for his beets, it is generally, though not universally, admitted that beets are more profitable than most other crops. The beet grower contends, however, that the prices he receives should depend upon the prices of sugar; in other words, that he should receive a price as high as the profits of the beet-sugar manufacturer will enable him to pay. The manufacturer, it should be noted, guarantees a price for beets before the seed are planted, thus assuring the grower a market at a fixed price. It is therefore argued, on the other hand, that as the manufacturer always assumes the risk of a decline in the price of sugar, while the farmer assumes no risk whatever in the price of beets, the latter should be content with the prices he has been receiving unless he is willing to assume the risk in a fluctuating sugar market. It is pointed out that it would be a shortsighted policy on the part of the manufacturer to force down the price of beets to a point unprofitable to the farmer, because in so doing he would force him to abandon that crop for others affording a profit.

The principle of basing the general price of beets upon the price of sugar seems to be an equitable one, but whether it can be made practical in its application can be determined only by experience.

The late Commissioner Will H. Parry manifested a special interest in this investigation. The intelligent judgment which he brought to bear upon all matters claiming his attention was especially valuable in this connection because of his intimate knowledge of the industry. The manuscript for the report had his approval and it was sent to the printer before his death.

Respectfully submitted.

WILLIAM J. HARRIS, *Chairman.*
JOSEPH E. DAVIES.
WILLIAM B. COLVER.
JOHN F. FORT.

THE BEET SUGAR INDUSTRY IN THE UNITED STATES.

CHAPTER I.

INTRODUCTION.

Section 1. Purpose and scope of the investigation.

This investigation was undertaken by the Bureau of Corporations because of complaints made by beet growers that the prices that they received for beets were not commensurate with the price of sugar and the consequent profits realized by beet sugar manufacturers. The work was not completed until after the Bureau of Corporations was merged into the Federal Trade Commission. The scope of the inquiry was broadened to cover not only the matter complained of by the farmers but also to include a careful study of the principal phases of the beet sugar industry in the United States, from the growing of the beets to the selling of the refined sugar. It is intended to show the condition of the industry as a whole.

The period covered by the report is the five years ending with the season of 1913–14. Every locality producing beet sugar in 1913 was visited and the books of every beet sugar manufacturing company operating in that year except one were examined. With this one exception all of the beet sugar manufacturers in the United States willingly gave access to their books and afforded every opportunity for the examination and compilation of all data desired. From the books of the companies there were obtained details of the cost of production, investment, capitalization, and earnings, and many other facts relating to their business.

The sales of sugar by months were obtained from all companies and also the quantity sold in each State wherever such data were available. These statistics show the average gross receipts per pound of sugar, the average freight rate and selling expenses, and the net price realized at the factory. Freight rates from all the beet sugar producing and the cane sugar refining districts have been compiled from published freight tariffs. A comparison of these rates from various beet sugar producing sections with the rates from the cane-sugar refineries to the principal centers of consumption marks in some measure the lines of competition between beet and cane sugars.

Hundreds of beet growers were visited in the vicinity of the beet-sugar factories and data regarding the costs and profits of beet growing were obtained from them. The reliability of this information is supported by a mass of statistical data secured from the beet-sugar factories and from the United States Department of Agriculture and various State agricultural experiment stations.

It was intended to collect and compile information covering the industry in the principal beet sugar producing countries of Europe. Agents were sent to France, Germany, and elsewhere in Europe, but before the work had progressed far beyond the preliminary stages it was abruptly terminated by the outbreak of war. The only resource left was such information relating to beet growing and the manufacture of beet sugar in Europe as was available in various publications. Many such publications have been carefully examined, but the published statistics covering these matters are generally incomplete in details and the statements of facts necessary for proper interpretation are inadequate. Under these circumstances it is impossible to make satisfactory comparisons with data collected in this country. For these reasons conditions in foreign countries are not discussed in the report.

Section 2. Some peculiar characteristics of the beet sugar industry.

In some important aspects the beet sugar industry is peculiar. Its principal raw material (beets) must be produced mainly in the vicinity of the factory and in sufficient quantity to assure a reasonable period of annual operation. Beets deteriorate in quality if kept for any considerable length of time, and consequently the annual operating period[1] of a factory is at most short, rarely exceeding 100 days, and often considerably below this. Except in the case of some branches of the canning industry these peculiar circumstances place the beet sugar industry practically in a class by itself among industrial activities. A beet sugar factory and the farmers supplying it with beets depend on each other in an unusual degree. The factory can not go to a remote district to secure its beets nor can the beet growers in one district find a profitable market for their product at any great distance from their farms. There are instances indeed where beets are shipped 100 to 200 miles, but such cases are rare and the quantity of beets shipped long distances forms an inconsiderable proportion of the total.

SHORT OPERATING PERIOD.—Sugar beets, as already stated, can not be kept a very long time without deterioration. They will keep in a frozen state, but they must be worked before they thaw. The

[1] The yearly transactions of a beet sugar factory is called a "campaign." It involves all matters in connection with the contracting for and manufacturing of a crop of beets. The campaign begins with the securing of contracts for a supply of beets and ends when the beets contracted in any one year have been converted into sugar.

harvest begins in the late summer or early fall, and they must therefore be worked before the first warm days of spring. For this reason the operating period of a factory is comparatively short, and the plants usually lie idle for at least two-thirds of the year and often longer. During the idle period the investment in the plant is not earning anything. Probably few if any other industries with such a large investment in plant equipment have such a short period of operation. Furthermore, when the plant ceases to operate the organization of employees is broken up and most of the employees are discharged. As a consequence, a considerable proportion of the employees in most factories are new and sometimes wholly inexperienced at the commencement of each working season.

The number of days each factory covered by this report operated in each year during the 5 years ending with 1913–14 is shown in Table 1, below. The table also shows the annual average number of days each factory operated in the 5 years and the average for all the factories in each State for each year and for the 5 years.

TABLE 1.—DAYS OF OPERATION, BY FACTORIES AND BY STATES, CAMPAIGNS OF 1909–10 TO 1913–14, INCLUSIVE.

State and company.	1909–10	1910–11	1911–12	1912–13	1913–14	Average.
Michigan.	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*
Continental Sugar Co. (Blissfield)	75	106	126	124	105	107
German-American Sugar Co. (Bay City)	90	118	114	72	71	93
Holland-St. Louis Sugar Co. (Holland)	53	63	128	75	80	80
Holland-St. Louis Sugar Co. (St. Louis)	69	110	138	74	103	99
Menominee River Sugar Co	38	39	77	73	56	57
Michigan Sugar Co. (Alma)	77	109	137	79	117	104
Michigan Sugar Co. (Bay City)	99	127	143	84	119	114
Michigan Sugar Co. (Caro)	100	123	133	68	96	104
Michigan Sugar Co. (Croswell)	72	104	136	51	78	88
Michigan Sugar Co. (Saginaw)	68	129	131	78	84	98
Michigan Sugar Co. (Sebewaing)	107	117	135	78	80	103
Mount Clemens Sugar Co	104	93	159	103	108	113
Owosso Sugar Co. (Lansing)	45	97	124	88	79	87
Owosso Sugar Co. (Owosso)	70	94	126	46	58	79
West Bay City Sugar Co	104	131	117	61	60	95
Western Sugar Refining Co	.....	.....	49	.....	.....	49
Average	78	104	123	77	86	94
Ohio and Indiana.						
Continental Sugar Co. (Findlay)	.....	.....	114	104	88	102
Continental Sugar Co. (Fremont)	86	80	127	105	76	95
German-American Sugar Co. (Paulding)	.....	89	100	76	65	83
Holland-St. Louis Sugar Co. (Decatur)	.....	.....	.....	56	47	52
Ottawa Sugar Co	.....	.....	.....	66	75	71
Toledo Sugar Co	.....	.....	.....	91	91	91
Average	86	85	114	83	74	85

TABLE 1.—DAYS OF OPERATION, BY FACTORIES AND BY STATES, CAMPAIGNS OF 1909-10 TO 1913-14, INCLUSIVE—Continued.

State and company.	1909-10	1910-11	1911-12	1912-13	1913-14	Average.
Wisconsin, Minnesota, and Iowa.	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*
Chippewa Sugar Co. (Wisconsin)	55	50	104	69	49	65
Rock County Sugar Co. (Wisconsin)	64	75	119	87	50	79
United States Sugar Co. (Wisconsin)	50	63	122	88	40	73
Wisconsin Sugar Co. (Wisconsin)	106	87	115	98	51	91
Iowa Sugar Co. (Iowa)	45	89	117	101	66	84
Minnesota Sugar Co. (Minnesota)	50	32	57	86	71	59
Average	62	66	106	88	55	75
Northern Colorado, Montana, and Nebraska.						
American Beet Sugar Co. (Grand Island)	48	65	69	84	77	69
Great Western Sugar Co. (Eaton)	97	59	60	95	122	87
Great Western Sugar Co. (Greeley)	79	58	59	99	114	82
Great Western Sugar Co. (Windsor)	85	56	61	97	72	74
Great Western Sugar Co. (Fort Collins)	101	57	61	105	122	89
Great Western Sugar Co. (Loveland)	101	67	67	105	119	92
Great Western Sugar Co. (Longmont)	95	51	55	104	118	85
Great Western Sugar Co. (Sterling)	109	88	73	97	107	95
Great Western Sugar Co. (Brush)	82	63	60	87	87	76
Great Western Sugar Co. (Fort Morgan)	85	.....	64	87	78	79
Great Western Sugar Co. (Billings)	87	83	107	96	114	97
Great Western Sugar Co. (Scottsbluff)	.....	48	93	112	125	95
Average	88	63	69	97	105	85
Southern Colorado and Kansas.						
American Beet Sugar Co. (Rocky Ford)	94	78	78	95	129	95
American Beet Sugar Co. (Las Animas)	46	.....	.....	51	.....	49
American Beet Sugar Co. (Lamar)	53	.....	.....	64	.....	59
Holly Sugar Co. (Holly)	65	44	.....	46	.....	52
Holly Sugar Co. (Swink)	89	56	58	70	91	73
National Sugar Manufacturing Co	90	53	52	81	58	67
San Luis Valley Beet Sugar Co	.....	.....	52	32	18	34
Western Sugar & Land Co	102	88	98	107	96	98
Garden City Sugar & Land Co	.....	.....	28	71	37	45
Average	77	64	61	69	72	69
Arizona and Nevada.						
Nevada Sugar Co	.....	.....	.....	35	34	35
Southwestern Sugar & Land Co	.....	40	55	44	51	48
Average	.....	40	55	40	43	43
Idaho and Oregon.						
Amalgamated Sugar Co. (Burley)	.....	.....	.....	59	71	65
Amalgamated Sugar Co. (La Grande)	50	34	32	.....	.....	39
Utah-Idaho Sugar Co. (Idaho Falls)	93	70	86	61	70	76
Utah-Idaho Sugar Co. (Sugar City)	100	62	109	92	81	89
Utah-Idaho Sugar Co. (Blackfoot)	51	.....	77	56	77	65
Utah-Idaho Sugar Co. (Nampa)	.....	11	.....	.....	.....	11
Average	74	44	76	67	75	67

TABLE 1.—DAYS OF OPERATION, BY FACTORIES AND BY STATES, CAMPAIGNS OF 1909-10 TO 1913-14, INCLUSIVE—Continued.

State and company.	1909-10	1910-11	1911-12	1912-13	1913-14	Average.
Utah.	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*
Amalgamated Sugar Co. (Ogden)	138	87	119	114	108	113
Amalgamated Sugar Co. (Logan)	122	74	94	99	100	98
Lewiston Sugar Co.	123	66	96	99	111	99
Utah-Idaho Sugar Co. (Lehi)	138	99	96	105	78	103
Utah-Idaho Sugar Co. (Garland)	114	76	90	82	101	93
Utah-Idaho Sugar Co. (Sevier)	.....	.....	88	82	73	81
Utah-Idaho Sugar Co. (Payson)	.....	.....	.....	.....	59	59
Average	127	80	97	97	90	98
California.						
Alameda Sugar Co.	113	93	116	95	72	98
American Beet Sugar Co. (Oxnard)	112	113	107	88	112	106
American Beet Sugar Co. (Chino)	109	109	107	90	96	102
Anaheim Sugar Co.	.....	.....	88	95	110	98
Holly Sugar Co. (Huntington Beach)	.....	.....	93	107	110	103
Los Alamitos Sugar Co.	139	143	140	97	111	126
Sacramento Valley Sugar Co.	78	79	91	124	97	94
San Joaquin Valley Sugar Co.	[1]	[1]	[1]	[1]	[1]	[1]
Santa Ana Cooperative Sugar Co.	.....	.....	.....	98	105	102
Southern California Sugar Co.	113	125	105	112	124	116
Spreckels Sugar Co.	[1]	[1]	[1]	[1]	[1]	[1]
Union Sugar Co.	147	126	121	117	139	130
Average	116	113	108	102	108	109

[1] Not reported.

Two factories in California could not give the number of days in operation. The 10 factories reporting in that State had an average operating period of 109 days during the 5 years covered. It is not probable that the 2 factories omitted would materially change this average if they were included. One of these factories apparently had very long operating periods, while for the other they were comparatively short. Utah and Michigan operated an average of 98 and 94 days, respectively. In Ohio and Indiana and northern Colorado the average operating period for the 5 years was 85 days. The factories in southern Colorado and in Idaho and Oregon operated an average of less than 70 days.

The longest period of operation for any factory in any year was 159 days by the Mount Clemens Sugar Co. in Michigan in 1911-12. The average for all the factories of Michigan for that year was 123 days. The long operating period in that State in that year was due to an unusually large supply of beets.

EFFORT REQUIRED TO SECURE BEETS.—It is the experience of most factories that they can not make sure of a supply of beets without considerable effort. Thus it is the custom for a representative of the factory to visit the farmers in the vicinity and induce them to enter into contracts to grow beets. These are formal written contracts stipulating the number of acres the farmer will plant and the prices the factory will pay. The factories usually agree to supply the seed at a fixed price. The contracts provide that the factory shall supervise the cultivation and the farmer agrees to cultivate in the manner prescribed by the factory. A condition that sometimes causes farmers to hesitate to enter into contracts is the difficulty encountered in securing labor. Since a very large proportion of the cost of growing beets is due to the expense of hand labor, farmers must have an assurance of such labor before they can safely plan for a crop. The factories, therefore, generally agree to supply this labor. When the factory engages to supply hand labor it is so stated in the contract and the price per acre is stipulated.

These efforts necessary to guarantee a supply of beets entail considerable expense. This expense varies from a cent or two per 100 pounds of sugar produced to sometimes more than 25 cents. A cost exceeding 5 cents per 100 pounds is quite common. These expenses per ton of beets vary from 5 cents or 6 cents to 50 cents or 60 cents. There are instances where the cost per ton of beets to the factory for these expenses has been as much as $1, but this is not usual.

Section 3. Development and progress of the beet sugar industry in the United States.

From a review of the beet sugar industry, issued by the United States Department of Agriculture in 1869, it appears that the first attempt to produce beet sugar in the United States was an experimental one made near Philadelphia in 1830, but no factory was built. A bulletin issued by the department in 1872 states that probably the earliest recorded experiments in beet sugar made in this country were in Massachusetts in 1838.[1] It appears that the manufacturer interested in the Massachusetts enterprise was awarded a silver medal for the production of a small quantity of sugar in that year. The secretary of the United States Beet Sugar Industry in a publication issued in 1913 stated that in 1852 Bishop Tyler of the Mormon Church purchased in France machinery for a sugar factory and shipped it to Salt Lake City.[2] In 1863 a factory was estab-

[1] U. S. Dept. A., Special Report on Beet Sugar Industry, 1897.
[2] Beet Sugar Industry of the United States, p. 6.

lished in Chatsworth, Ill. After struggling for several years it was removed to Freeport, Ill., and later to Blackhawk, Wis.[1]

Bulletin 210, issued by the United States Department of Agriculture in 1870, reported three factories in operation, one at Chatsworth, Ill., one at Alvarado, Cal., and one in Sauk County, Wis. Prior to this, however, namely, in 1867, there appears to have been a factory at Fond du Lac, Wis. About 1878 a factory was built in Maine, and other factories had been built in California and possibly elsewhere. Nearly all of these earlier factories were failures mainly on account of the unwillingness or the inability of farmers to produce beets in sufficient quantities and quality to supply the factories. By 1892 there appears to have been only six factories in operation.[2] In 1893 investigations relating to the beet-sugar industry by the Department of Agriculture were suspended and no statistics are again available until 1897.

In 1897 there were nine factories in operation, four in California, two in Nebraska, one in New York, one in New Mexico and one in Utah.[3]

BUILDING OF BEET-SUGAR FACTORIES IN THE UNITED STATES SINCE 1889.—A chronological list of the beet-sugar factories in the United States has been prepared from various sources of information but mainly from bulletins issued by the United States Department of Agriculture. In 1909 the Secretary of Agriculture in response to a resolution adopted by the Senate furnished a statement showing the number of beet-sugar factories then in operation in the United States and the number erected each year since 1896.[4] This document has been taken as the basis for the information relative to the erection of factories. The factories built or beginning operation in each year since 1889 are shown in the following statement:

1890.

American Beet Sugar Co., Grand Island, Nebr.

1891.

Chino Valley Beet Sugar Co., Chino, Cal.
Utah Sugar Co., Lehi, Utah.
American Beet Sugar Co., Norfolk, Nebr. (Removed to Lamar, Colo., in 1905.)

[1] University of Wisconsin Bulletin No. 55.
[2] Beet Sugar Industry of the United States, Department of Agriculture, 1897.
[3] Beet Sugar Industry in the United States, U. S. Department of Agriculture, 1897, p. 160.
[4] S. Doc. 22, 61st Cong., 1st sess.

1897.

Los Alamitos Sugar Co., Los Alamitos, Cal.
Pecos Valley Beet Sugar Co., Carlsbad, N. Mex. (Operated unsuccessfully for two years. It was closed and later destroyed by fire.)
First Beet Sugar Co., Rome, N. Y. (On account of bad management and lack of beets died after two years.)

1898.

California Beet Sugar & Refining Co., Crockett, Cal. (Removed to Corcoran, Cal., in 1909.)
Oregon Sugar Co., La Grande, Oreg. (Removed to Burley, Idaho, in 1911.)
Ogden Sugar Co., Ogden, Utah.
Michigan Sugar Co. (old), Bay City, Mich. (Removed to Waverly, Iowa, in 1907.)
Minnesota Sugar Co., St. Louis Park, Minn. (Burned in 1905.)
Binghamton Sugar Co., Binghamton, N. Y. (Removed to Blackfoot, Idaho, in 1904.)
American Beet Sugar Co., Oxnard, Cal.

1899.

Spreckels Sugar Co., Salines, Cal.
Union Sugar Co., Santa Maria, Cal. (Betteravia.)
Illinois Sugar Refining Co., Pekin, Ill. (Produced a little sugar only one year. Part of machinery moved to Visalia, Cal.)
Colorado Sugar Manufacturing Co., Grand Junction, Colo. (Now Western Sugar & Land Co.)
Standard Beet Sugar Co., Ames, Nebr. (Removed machinery to Scottsbluff, Nebr., in 1910.)
Bay City Sugar Co., Bay City, Mich.
Detroit Sugar Co., Rochester, Mich. (Removed to Madison, Wis., in 1906.)
Wolverine Sugar Co., Benton Harbor, Mich. (Moved to Canada in 1901.)
Peninsular Sugar Co., Caro, Mich.
West Bay City Sugar Co., West Bay City, Mich.
Alma Sugar Co., Alma, Mich.
Holland Sugar Co., Holland Mich.
Kalamazoo Sugar Co., Kalamazoo, Mich. (Moved to Chippewa, Wis., in 1903.)
D. C. Corbin, Waverly, Wash.

1900.

American Beet Sugar Co., Rocky Ford, Colo.
National Sugar Co., Sugar City, Colo.
Continental Sugar Co., Fremont, Ohio.
Empire State Sugar Co., Lyons, N. Y. (Moved to Anaheim, Cal., in 1911.)

1901.

Marine City Sugar Co., Marine City, Mich.
Lansing Sugar Co., Lansing, Mich.
Saginaw Sugar Co., Saginaw, Mich. (Moved to Sterling, Colo., in 1905.)
Western Construction Co., Loveland, Colo.
Wisconsin Sugar Co., Menominee Falls, Wis.
Logan Sugar Co., Logan, Utah.

1902.

German-American Cooperative Beet Sugar Co., Salzburg, Mich.
Sebewaing Sugar Co., Sebewaing, Mich.
Valley Sugar Co., Carrollton, Mich.
Macomb Sugar Co., Mount Clemens, Mich.
Sanilac Sugar Refining Co., Croswell, Mich.
Eaton Sugar Co. Eaton Colo.
Greeley Sugar Co., Greeley, Colo.

1903.

Menominee River Sugar Co., Menominee, Mich.
Tawas Sugar Co., East Tawas, Mich. (Moved to Chaska, Minn., in 1905.)
Owosso Sugar Co., Owosso, Mich.
Windsor Sugar Co., Windsor, Colo.
Idaho Sugar Co., Idaho Falls, Idaho.
Utah Sugar Co., Garland, Utah.
St. Louis Sugar Co., St. Louis, Mich.
Longmont Sugar Co., Longmont, Colo.

1904.

Fort Collins Sugar Manufacturing Co. Fort Collins Colo.
Fremont Sugar Co., Sugar City, Idaho.
Rock County Sugar Co., Janesville, Wis. (Old Dresden, Ontario, plant.)
Chippewa Sugar Co., Chippewa Falls, Wis.
Snake Valley Sugar Co., Blackfoot, Idaho.

1905.

American Beet Sugar Co., Lamar, Colo.
Holly Construction Co., Holly, Colo. (Now Holly Sugar Co.)
Charles Pope, Chicago, Riverdale, Ill.
Sterling Sugar Co., Sterling, Colo.
Continental Sugar Co., Blissfield, Mich.
Amalgamated Sugar Co., Lewiston, Utah.

1906.

Charlevoix Sugar Co., Charlevoix, Mich. (Moved to Ottawa, Ohio, in 1911.)
Pacific Sugar Co., Visalia, Cal.

Alta, Cal., Beet Sugar Co., Hamilton City, Cal.
Utah-Idaho Sugar Co., Nampa, Idaho.
United States Sugar & Land Co., Garden City, Kans.
United States Sugar Co., Madison, Wis.
Holly Construction Co., Swink, Colo.
Carver County Sugar Co., Chaska, Minn.
Billings Sugar Co., Billings, Mont.
Great Western Sugar Co., Brush, Colo.
Great Western Sugar Co., Fort Morgan, Colo.
Southwestern Sugar & Land Co., Glendale, Ariz.

1907.

Iowa Sugar Co., Waverly, Iowa.
American Beet Sugar Co., Las Animas, Colo.

1909.

Pacific Sugar Co., Corcoran, Cal. (Moved machinery from Crockett, Cal.)
Southern California Sugar Co., Santa Ana, Cal. (Moved from Wiarton, Ontario.)

1910.

Scottsbluff Sugar Co., Scottsbluff, Nebr.
German-American Sugar Co., Paulding, Ohio.

1911.

Anaheim Sugar Co., Anaheim, Cal.
Holly Sugar Co., Huntington Beach, Cal.
San Louis Valley Sugar Co., Monte Vista, Colo.
Continental Sugar Co., Findlay, Ohio.
Utah-Idaho Sugar Co., Elsinore, Utah.

1912.

Holland-St. Louis Sugar Co., Decatur, Ind.
Amalgamated Sugar Co., Burley, Idaho.
Toledo Sugar Co., Toledo, Ohio.
Ottawa Sugar Co., Ottawa, Ohio.
Santa Ana Cooperative Sugar Co., Dyer, Cal.
Nevada Sugar Co.; Fallon, Nev.

1913.

Utah-Idaho Sugar Co., Payson, Utah.

From the foregoing statement it is seen that there was a marked impetus in factory building in the late nineties. Seven new factories were completed in 1898 and 14 in 1899. This expansion was marked and steady down to and including 1906. Only two factories were built in each of the years 1907, 1909, and 1910. None was built in

1908. In 1911 and 1912 there was renewed activity in building, 11 factories being completed in those two years.

It is worthy of note that of the 14 factories built in 1899 eight of them were in Michigan. This extraordinary expansion of the industry in Michigan was no doubt due to the enactment of a law by the legislature in 1897 providing for a State sugar bounty (see p. 15).

An increase in production naturally followed the increased number of factories. Prior to 1891 there had not been produced as much as 3,000 tons of sugar in any one year. In 1891 the production was 5,400 tons. By 1897 this had increased to about 40,000 tons, and by 1900 the production reached nearly 83,000 tons. The increase in production and its relation to consumption are shown in Table 3 (see p. 17).[1]

LOCATION OF BEET-SUGAR FACTORIES IN 1914.—There were 78 beet-sugar factories in the United States in 1914, located in 17 States, as follows:

Arizona	1	Montana	1
California	13	Nebraska	2
Colorado	16	Nevada	1
Idaho	5	Ohio	5
Illinois	1	Utah	7
Indiana	1	Washington	1
Iowa	1	Wisconsin	4
Kansas	1	Wyoming	1
Michigan	16		
Minnesota	1	Total	78

Ten of the above States have only 1 factory each, and one State has only 2. The four principal centers of production are Michigan and northern Ohio, Colorado, northern Utah and southern Idaho, and southern California. In comparatively recent years there were factories in New York and Oregon, but these have all been abandoned or removed to other States. The factory in Washington has not been in operation for several years. One at Holly, Colo., was removed to Sheridan, Wyo., in 1915. The plant at Glendale, Ariz., has never been able to secure a sufficient quantity of beets, and in the season of 1914–15 some experiments were made with sugar cane.

GROWTH OF PRODUCTION.—Naturally the growth of production has kept pace with the increased number of factories. The annual pro-

[1] Tonnage figures taken from Final Report, Industrial Commission, p. 84.

duction of beet sugar in the United States from 1889–90 to 1914–15, inclusive, is shown in Table 2 below:

TABLE 2.—ANNUAL PRODUCTION OF BEET SUGAR IN THE UNITED STATES FROM 1889–90 TO 1914–15, INCLUSIVE.

(NOTE.—The figures for 1909–10 to 1913–14, inclusive, were compiled by the Federal Trade Commission; for other years they are taken from year books and bulletins of the United States Department of Agriculture.)

Year.	Production.	Year.	Production.
	Short tons.		*Short tons.*
1889–90	2,467	1902–3	218,406
1890–91	3,874	1903–4	240,604
1891–92	5,999	1904–5	242,113
1892–93	13,460	1905–6	312,921
1893–94	22,344	1906–7	483,612
1894–95	22,503	1907–8	463,628
1895–96	32,726	1908–9	425,884
1896–97	42,040	1909–10	[1] 509,655
1897–98	45,246	1910–11	[1] 510,821
1898–99	36,368	1911–12	[1] 585,385
1899–1900	81,729	1912–13	[1] 688,174
1900–1901	68,082	1913–14	[1] 726,764
1901–2	184,606	1914–15	722,054

[1] The production for this year does not agree with that given in the reports of the Department of Agriculture. The difference is no doubt due either to erroneous returns made by manufacturers to the department or their reporting on a different basis from that used by the Commission. The figures for production obtained by the Commission represent granulated sugar actually packed for market. It is possible that some factories in reporting to the Department of Agriculture included sugar in process. If this was the case the production would be too high because such sugar would always be included twice, since sugar in process at the end of the year becomes part of the production for the next year. The total production figures of the Commission include, first, those taken directly from the books of the company and, second, either an estimate or returns secured from other sources. The first includes nearly all the sugar produced, the latter representing only a few small factories. For 3 of the years the actual figures secured by the Commission covered more than 99 per cent of the total production, and in the other 2 years they covered 97½ per cent. The figures reported to the Commission, those estimated or secured from other sources, the total production as used in this report, the production shown by the Department of Agriculture, and the difference between the last two items are shown by the following table:

Year.	Federal Trade Commission.			Total production as stated by Department of Agriculture.	Difference.
	Secured from books of companies or reported to the Commission.	Returns from other sources or estimated.	Total production.		
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1909–10	496,690	12,965	509,655	512,469	2,814
1910–11	498,820	12,001	510,821	510,172	649
1911–12	580,553	4,832	585,385	599,500	14,115
1912–13	684,674	3,500	688,174	692,556	4,382
1913–14	723,264	3,500	726,764	733,401	6,637
1914–15	.....	.....	.....	722,054	.....

Prior to 1889 the production of beet sugar exceeded 1,000 tons in only two years. From the foregoing table it is seen that in 26 years the production has increased from less than 2,500 tons to

more than 700,000 tons. The production in 1892 more than doubled that of the preceding year. There was a considerable increase until in 1901 the production was more than twice as much as it had been in any year prior to that time. From 1902 to 1908 the production more than doubled. The remarkable increase beginning in the late nineties was due to various causes. The United States Department of Agriculture and various State experiment stations had conducted campaigns of education among the farmers and favorable legislation by the United States and by some of the States had greatly encouraged the building of factories.

Section 4. Governmental encouragement of the industry.

The development of the beet-sugar industry in the United States has resulted largely from direct encouragement by the Federal and State Governments. The successful results in France and Germany no doubt first suggested an effort to develop beet-sugar manufacture in this country. According to the final report of the Industrial Commission (p. 84), the beginning of the beet-sugar industry in this country dates from 1862, though some experiments were made as early as 1835. The principal difficulties to overcome were agricultural. The American farmer did not understand the cultivation of the beet and it was not definitely known in what particular sections of the country the best results might be obtained. The United States Department of Agriculture and various State agricultural colleges and experiment stations began to supply seed to farmers and to give them instructions as to planting and cultivation. These experiments were conducted in many of the States and covered a period of several years. In fact, experimental work is still being done through governmental agencies.

ENCOURAGEMENT THROUGH FEDERAL TARIFF LEGISLATION.—Since 1883 various Federal tariff acts have afforded a large measure of protection to the sugar industry. The act of 1883 provided for a rate of $1.40 per 100 pounds on sugars not above No. 13 Dutch standard in color and not above 75° polariscope test.[1] Under this law sugar testing 96° was subject to a duty of $2.24 per 100 pounds. These rates were in effect until 1891. By the tariff act of 1890 (effective Apr. 1, 1891) sugar not above 16 Dutch standard in color was admitted free of duty. By the same act, however, there was

[1] The Dutch standard consists of a series of crystallized sugar samples of approximately equal gradations of color ranging from No. 7, which is very dark, to No. 25, which is almost white. The color grade of any given sample is determined by a comparison with the standard series prepared by an establishment in Holland for the sugar trade. * * * No. 16 Dutch standard is technically the color distinction in the United States between refined and raw sugar. (The Department of Commerce, Circular of Bureau of Standards No. 44, p. 50.)

The degree of polarization means the per cent of sucrose. Thus, by 96° sugar is meant that 96 per cent of the weight of the mass tested is sucrose.

provided a bounty of 2 cents per pound on domestic sugar testing not less than 90° polariscope test and a bounty of 1¾ cents per pound on sugar testing less than 90°, but not less than 80°. Thus the bounty provision of 1890 afforded almost as much protection to the domestic sugar grower as was secured under the previous tariff.

In 1894 the bounty law was repealed and an ad valorem duty of 40 per cent was levied on all sugars above 16 Dutch standard in color and one-tenth of a cent per pound additional on sugar from bounty-paying countries. The 40 per cent ad valorem was equivalent to 1 cent per pound on sugar selling for 2½ cents per pound in the foreign market.

By the act of 1897 the duty was fixed at 0.95 of a cent per pound on sugar not above 16 Dutch Standard and not above 75° polariscope test. The additions for the higher tests made the rate on 96° sugar 1.685 cents per pound. These rates remained until March, 1914, except as to sugar from the Philippines and Cuba.

By the act of March 8, 1902, the rate on Philippine sugar was made 25 per cent less than the general rate. The reciprocity treaty with Cuba, ratified December 27, 1903, provided that the duty on Cuban sugar should be 20 per cent less than the general rate.

The tariff act of 1913 fixed a rate of 0.71 of a cent per pound on sugar not above 75° polariscope test and twenty-six one-thousandths of a cent for each additional degree. This made the duty on 96° sugar 1.256 cents per pound. These rates became effective March 1, 1914. This act repeals that portion of the Cuban reciprocity treaty relating to sugar.. Under the Cuban reciprocity treaty the duty on Cuban sugar testing not more than 96° was at the time of its ratification 1.348 cents per pound. Since March 1, 1914, the rate on Cuban sugar has been 1.005 cents per pound.

ENCOURAGEMENT THROUGH STATE LEGISLATION.—Several States have enacted laws to encourage the sugar industry, some by exempting property employed in its manufacture from taxation for a period of years, and some by bounties. There are now no State bounty laws in effect. They either originally covered a stated period or they have been repealed or declared unconstitutional.

Idaho.—In 1903 the Legislature of Idaho passed an act providing for a bounty of one-half cent per pound for sugar manufactured during the year 1904. There has been no further legislation on the subject.

Kansas.—In 1905 a law was enacted providing for a bounty of $1 per ton for all sugar beets grown within the State and actually used in the manufacture of sugar. An appropriation of $10,000 was made for the payment of bounties during the year 1906–7.

Iowa.—In 1889 the property of sugar manufacturers, including the capital invested and the personal property used in connection with

the business, was exempted from taxation until January 1, 1910. The act was amended in 1907 extending the period of exemption to January 1, 1917.

Minnesota.—In 1895 the State of Minnesota provided a bounty of 1 cent per pound on sugar manufactured in that State. In 1899 this act was amended so as to limit the amount of money that could be paid out in any one year to not exceeding $40,000. The act also provided that it should remain in effect only until the 1st day of January, 1901. The State auditor refused to issue warrants for the sugar bounty provided for in the law of 1895 and as amended in 1899 for the year 1900. The action of the auditor was reviewed by the supreme court of the State and in 1903 the law was declared unconstitutional.[1]

Michigan.—In 1897 the Legislature of Michigan enacted a law providing for a bounty of 2 cents per pound on all sugar produced within the State. The validity of this law was questioned by the attorney general of the State and no bounties were paid except for one or two years. In Michigan Sugar Co. *v.* Auditor General,[2] it was held that that section of the law providing for the payment of a bounty for the encouragement of the beet-sugar industry was unconstitutional.

Nebraska.—A law of Nebraska enacted in 1895 offered a bounty for the manufacture of sugar. It appears that the legislature failed to make appropriations to pay these bounties. In Oxnard Beet Sugar Co. *v.* Nebraska,[3] it was held in 1905 that the fact that the manufacturers paid producers high prices for beets (presumably because they expected a bounty) did not create in favor of such manufacturers an obligation against the State.

New York.—In May, 1897, the Legislature of New York passed an act providing for the payment of 1 cent per pound to sugar manufacturers who paid the grower not less than $5 per ton for beets, and appropriated $25,000 for making the act effective. In 1898 $50,000 was appropriated for this purpose. Again, in 1900, there was an appropriation of $50,000, and one of $100,000 in 1901. In 1902 an act was passed appropriating $50,000 to pay bounties to beet-sugar manufacturers of one-half cent per pound, and provided that the bounties in 1903 and 1904 should also be one-half cent per pound. In 1904, $60,000 were appropriated for beet-sugar bounties. No appropriations have been made since that time. In June, 1905, another bounty act was passed which provided that appropriations thereafter made to encourage beet culture should be distributed to the manufacturers and beet growers, the latter to receive $1 per ton for beets. It appears that no appropriation was ever made under this act and in 1908 the act of 1905 was repealed.

[1] 91 Minn., 30. [2] 124 Mich., 674. [3] 79 Nebr., 57–66.

THE EFFECT OF TARIFFS AND BOUNTIES ON THE INDUSTRY.—There is no question that Federal tariffs and in some cases State bounties have greatly stimulated the beet-sugar industry. The beginning of the construction of several factories in 1898 and their completion in 1899 (see p. 8) was no doubt largely due to the enactment of the Michigan bounty law. This State bounty law in connection with the Federal tariff law of 1897 afforded a large measure of encouragement in that State. Following the enactment of the bounty law in the State of New York a factory was built in 1897, another in 1898, and another in 1900. It is said that the last of these factories was removed from the State because of the failure of the State to pay bounties.

For several years following the tariff act of 1897 there was a remarkable expansion of the industry in what are now the principal beet sugar producing sections of the country. Down to the time of the reciprocity treaty with Cuba in 1903 the duty of $1.68½ per 100 pounds on raw sugar testing 96° afforded great advantage to this industry, and even after the Cuban reciprocity treaty when the duty was reduced to about $1.35 per 100 pounds the advantage was still very great.

To what extent the large measure of protection to the industry encouraged careless selection of localities for factories can not be stated. It is probable that the expectation of a wide margin of profit provided for in the tariff had such a tendency to foster carelessness in the selection of factory locations. A number of factories have been built without particular regard to the quantity and quality of beets available, apparently with the expectation that the business would be so profitable that extraordinary inducements could be offered to farmers. Naturally an undue, artificial stimulus also results in a lack of thorough care in equipping and operating factories.

Section 5. Consumption of sugar in continental United States.

The per capita consumption of sugar in continental United States is greater than that of any other country except Great Britain. Figures for consumption include sugar used in any form. There are no figures indicating the amount of sugar per capita used as such for strictly domestic purposes. It is well known that a large percentage of the sugar consumption is in the form of candies and other confections, preserves, jams, etc. Furthermore, there is considerable sugar used in the manufacture of tobacco and in various other ways. The total consumption of sugar in continental United States, the source of supply, the per capita consumption in the United States, and the per cent of the world's production consumed in the United States, from 1865 to 1914, are shown in Table 3 below:

TABLE 3.—CONSUMPTION OF SUGAR IN CONTINENTAL UNITED STATES, 1865–1914.
[Statistical Abstract: Bureau of Foreign and Domestic Commerce.]

Year.	Total consumption in United States (continental).[1]	Percentage of consumption supplied by—			Per capita consumption in United States.[1]	Per cent of world's product consumed in United States.
		Domestic.	Noncontiguous territory.	Foreign countries.		
	Pounds.				*Pounds.*	
1865	631,397,214	1.9	11.1	87.0	18.17	14.3
1866	1,008,603,114	2.1	15.0	82.9	28.45	22.0
1867	880,009,330	5.8	14.7	79.5	24.30	17.4
1868	1,155,275,475	4.5	12.7	82.8	31.24	24.5
1869	1,328,534,744	7.7	12.3	80.0	35.19	24.9
1870	1,261,941,665	7.0	16.2	76.8	32.73	23.3
1871	1,442,470,531	12.4	14.9	72.7	36.47	24.4
1872	1,649,834,977	9.5	16.4	74.1	40.64	28.1
1873	1,670,246,701	8.1	12.3	79.6	40.08	24.8
1874	1,782,063,238	6.2	10.6	83.2	41.64	25.4
1875	1,904,621,896	7.5	13.2	79.3	43.33	29.0
1876	1,598,951,344	10.8	12.6	76.6	35.42	24.3
1877	1,811,268,726	11.0	14.2	74.8	39.07	29.8
1878	1,645,604,810	9.7	14.8	75.5	34.59	22.7
1879	2,002,953,025	12.5	11.9	75.6	40.99	25.0
1880	1,970,221,478	9.2	14.1	76.7	39.46	27.1
1881	2,201,187,313	13.0	14.4	72.6	42.89	26.9
1882	2,142,904,249	8.0	16.3	75.7	40.82	24.9
1883	2,426,981,787	13.2	15.9	70.9	45.20	25.5
1884	2,975,026,610	10.2	18.8	71.0	54.18	28.4
1885	2,687,818,446	8.5	18.9	72.6	47.87	24.5
1886	2,818,144,031	10.8	20.5	68.7	49.09	27.6
1887	3,125,276,345	6.2	19.1	74.7	53.26	27.5
1888	3,016,360,183	12.5	20.5	67.0	50.29	27.4
1889	3,091,376,231	11.3	16.5	72.2	50.44	27.7
1890	3,192,735,098	9.6	17.6	72.8	50.72	25.0
1891	3,875,344,121	13.0	9.0	78.0	60.70	27.6
1892	3,919,671,292	9.8	11.2	79.0	60.22	27.5
1893	4,262,589,311	12.3	12.0	75.7	64.24	29.4
1894	4,936,382,960	13.3	10.7	76.0	72.99	29.9
1895	4,321,674,363	17.9	9.2	72.9	62.69	24.3
1896	4,494,681,898	13.6	12.9	73.5	63.98	27.1
1897	5,598,391,028	13.0	10.5	76.5	78.20	31.4
1898	3,468,736,934	23.0	18.1	58.9	47.55	20.0
1899	4,604,811,191	13.9	13.5	72.6	61.98	25.7
1900	4,477,175,236	10.9	14.0	75.1	58.91	23.1
1901	5,585,008,783	14.3	14.9	70.8	71.96	25.7
1902	5,018,972,657	21.9	18.2	59.9	63.35	20.4
1903	6,380,165,502	18.5	16.0	65.5	78.92	28.7
1904	5,661,900,411	17.8	18.7	63.5	68.66	24.5
1905	6,025,772,362	21.0	19.6	59.4	71.66	28.3
1906	6,491,294,803	21.4	18.9	59.7	75.74	20.8
1907	7,089,668,935	21.3	17.7	61.0	81.19	21.9
1908	6,590,822,991	26.0	24.0	50.0	74.11	21.1
1909	7,283,363,552	21.8	21.9	56.3	80.43	22.3
1910	7,360,130,811	19.0	25.2	55.8	79.90	22.0
1911	7,235,972,746	23.0	26.0	51.0	77.15	19.0
1912	7,862,155,291	23.2	30.2	46.6	82.43	22.1
1913	8,234,477,135	20.8	24.7	54.5	85.04	20.2
1914	8,798,794,928	22.7	21.3	56.0	89.14	21.1

[1] Expressed mainly in terms of raw sugar.

The per capita consumption has increased from 18 pounds in 1865 to 89 pounds, or nearly 400 per cent, in 1914. Fifty years ago 87 per cent of the sugar consumed in this country was imported. This proportion has gradually fallen until it is now less than 60 per cent. Parallel with this relative decrease in the proportion of the total consumption imported there has been of course a corresponding increase in domestic production. The sugar supplied to the United States by its noncontiguous territory, the Hawaiian Islands, the Philippines, and Porto Rico, is now about 21 per cent of the total consumption, and the percentage supplied by continental United States, including both beet and cane, is somewhat greater.

At the present time practically all the sugar consumed in this country is produced in the United States, including its possessions, and in Cuba. The imports from other foreign countries than Cuba are comparatively insignificant.

It is a remarkable fact that approximately one-fifth of all the commercial sugar of the world is consumed in the United States.

PERCENTAGE OF CONSUMPTION SUPPLIED BY DOMESTIC BEET-SUGAR FACTORIES.—Practically all the beet sugar made in this country is consumed here. From 50 to 55 per cent of the sugar consumed in the United States is imported; the remainder comes in about equal proportions from beets and Louisiana cane, and from Hawaii, the Philippines, and Porto Rico. The percentage of the total consumption produced in domestic beet factories and from Louisiana cane for the last 16 years is shown in Table 4 below:

TABLE 4.—PERCENTAGE OF THE TOTAL CONSUMPTION OF SUGAR IN THE UNITED STATES PRODUCED FROM DOMESTIC CANE AND BEETS, 1899 TO 1914, INCLUSIVE.

[Computed from the Statistical Abstract, 1914, Bureau of Foreign and Domestic Commerce.]

Year.	Louisiana cane.	Beet.	Total.	Year.	Louisiana cane.	Beet.	Total.
1899	12.3	1.6	13.9	1907	7.7	13.6	21.3
1900	7.2	3.7	10.9	1908	11.9	14.1	26.0
1901	11.2	3.1	14.3	1909	11.4	11.7	23.1
1902	14.5	7.4	21.9	1910	10.2	13.9	24.1
1903	11.7	6.8	18.5	1911	9.8	14.1	23.9
1904	9.3	8.5	17.8	1912	9.2	15.3	24.5
1905	13.0	8.0	21.0	1913	3.9	17.6	21.5
1906	11.8	9.6	21.4	1914	6.7	16.7	23.4

It should be pointed out that the totals in the above table do not exactly agree with the percentage of consumption supplied from domestic sources as shown in Table 3. This is due to the fact that in the latter table the exports of domestic sugar have been deducted, while in Table 4 they have not. The purpose of Table 4 is to show what percentage of the total consumption is produced in beet-sugar factories.

It appears from the table that in recent years domestic beet-sugar factories have produced enough to meet about 15 per cent of the domestic demand. In fact, the proportion is somewhat greater than this. About half of the domestic consumption is reported in terms of raw sugar, while all of the beet-sugar production is reported in terms of refined sugar. The proportion of the consumption produced in the beet factories is therefore a little greater than the figures in the foregoing table would indicate. It is worthy of note that during the past eight years the increase in the production of beet sugar has just about kept pace with the increased total consumption.

CHAPTER II.

BEET GROWING.

I. YIELD AND QUALITY OF BEETS IN THE UNITED STATES.

Section 1. Introduction.

The widely extended area in which the sugar beet can be grown in this country, the methods of cultivation, and the particular problems that may confront the grower are not discussed in this report. All these matters have been thoroughly studied by the United States Department of Agriculture, and a vast amount of information relating to every phase of beet culture is available to anyone interested. The discussion of beet culture in this report is confined to the concrete results and the economic aspects of this branch of farming.

The farmer is the most important factor in the beet-sugar industry. He must supply beets in sufficient quantity and quality or else the beet-sugar manufacturer can not exist. Sugar-beet culture demands closer vigilance on the part of the farmer than is necessary to grow the ordinary farm crops, such as grain, hay, etc. In a revised edition of Farmers' Bulletin 52, issued by the United States Department of Agriculture in 1910, the high class of farming necessary to grow sugar beets successfully was pointed out in the following language:

> The successful growing of sugar beets is an art that one acquires by practice. The farmer who has made a success of raising other crops will quite often fail at first in this one, as the methods of cultivating ordinary crops do not apply in the case of sugar beets. Certain directions for the preparation of the soil, the planting, thinning, and harvesting must be followed in beet culture. Although it is possible to raise sugar beets with little regard to these directions, such a crop will usually fail to pay for itself, either because the yield is too small or the sugar content of the beets too low to meet factory requirements. In commercial beet growing, therefore, carelessness leads quickly to failure, while careful regard for details spells success. Success comes at first from following the advice of successful growers, and later it may be augmented by practical experience.

From the foregoing and from numerous other statements embodying the experience of experts and of practical farmers, it appears that beets are one of the most exacting crops grown. The land must

be adapted not only to produce beets in reasonably large quantities but of such quality as to insure a high sugar content. Furthermore, the sugar content must be of a degree of purity high enough to guarantee its profitable conversion into edible sugar. Probably no other crop reflects more fully improper or careless methods of culture or the neglect of doing everything at the proper time.

Section 2. Yield of sugar beets per acre.

The quantity of beets grown per acre varies according to the variety of beets, quality of seed, quality of land, methods of cultivation and moisture conditions. There is a wide variation of production in different sections of the country and even among different growers in the same section. Thus production frequently ranges from 6 or 7 tons to 15 tons per acre, and in extreme cases the range is much wider. In some localities a yield of 20 tons per acre is not uncommon. The average for the United States has been as much as 11 tons per acre but once in 11 years. Table 5 below shows the average yield per acre in the principal beet-growing States and for the United States from 1904 to 1914 inclusive:

TABLE 5.—AVERAGE YIELD OF SUGAR BEETS PER ACRE IN THE UNITED STATES, BY STATES, 1904 TO 1914, INCLUSIVE.

[Compiled from bulletins of the U. S. Department of Agriculture.]

Year.	California.	Colorado.	Michigan.	Utah and Idaho.	Wisconsin.	Other States.	United States.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1904	12.06	12.38	8.06	11.48	11.37	9.01	10.47
1905	9.92	10.19	6.83	8.25	8.86	7.62	8.67
1906	11.17	13.41	8.57	13.89	10.19	9.76	11.26
1907	10.23	11.93	7.89	10.94	10.37	8.33	10.16
1908	10.39	9.28	7.54	11.60	9.37	8.65	9.36
1909	10.63	10.33	7.31	13.24	10.21	8.47	9.71
1910	10.20	10.62	10.28	10.42	9.14	9.29	10.17
1911	10.42	11.07	9.90	12.72	11.02	10.61	10.68
1912	9.01	11.32	6.75	10.81	10.27	9.40	9.41
1913	8.92	10.93	8.85	11.37	9.66	8.87	9.76
1914[1]	10.40	12.60	8.50	12.45	(1)	10.70	10.90

[1] Included with "Other States."

The statistics for Utah and Idaho have been combined in this table and in all other similar tables because of their proximity and the interrelation of factory interests. From the above table it is seen that the highest average yields are in Colorado and Utah and Idaho. In these States taken together the average is above the average for the United States for every year during the period covered except one. In California the average for the State was above the average for the United States for 6 years in 11. In Wisconsin the average was above that for the United States for 7 years out of 10.

The average in Michigan is very low. In only one year during the period covered was the average in that State equal to the average for the United States.

Section 3. Quality of beets.

Special emphasis should be placed on the importance of the quality of beets. Unless the quality is of a fair degree it does not pay to extract the sugar. There are two elements of quality, namely, the sugar content and the degree of purity. A considerable percentage of the total weight of the beets consists of soluble solids and most of these solids consists of pure sugar. The per cent of the total weight of the beets that is pure sugar is called the sugar content. The per cent of the total soluble solids that is pure sugar is called the degree or percentage of purity. This is discussed on the following page.

Under existing conditions it does not pay to work beets testing below 10 or 12 per cent of sugar. Indeed, an average content as low as this probably could not be profitably worked. Some factories reserve the right to reject beets testing below 11 or 12 per cent. The average should be well above 12 per cent. Likewise, the percentage of purity must not be too low because the lower the per cent of pure sugar in the soluble solids the higher is the relative cost of extraction. Some factories reserve the right to reject beets showing a purity below 80 per cent, and probably no factory would care to run on beets having an average below that percentage.

PERCENTAGE OF SUGAR IN BEETS.—The sugar content of the beets worked by the sugar factories of the United States for 11 years ending with 1913–14 ranged from 14.90 in 1906 to 16.38 in 1914. It was above 16 per cent but 4 years of the 11. It should be understood that the entire sugar content of beets can not be extracted. A ton of beets testing 15 per cent contains 300 pounds of pure sugar at the time of delivery to the factory, but that amount can not be extracted. Some of it is lost between the time of purchase of the beets and their manufacture, some of it is left in the beet pulp, some remains in the molasses, and some is lost—that is, it can not be accounted for at all. The percentage of sugar in the beet is therefore always greater than the percentage extracted (see p. 25).

The average sugar content of the beets worked in the United States from 1904 to 1914, inclusive, is shown in Table 6 following.

TABLE 6.—AVERAGE SUGAR IN BEETS USED IN THE UNITED STATES, BY STATES, 1904 TO 1914.

[Compiled from bulletins of the U. S. Department of Agriculture.]

Year.	California.	Colorado.	Michigan.	Utah and Idaho.	Wisconsin.	Other States.	United States.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	15.74	15.64	15.13	14.82	14.54	15.36	15.33
1905	17.27	14.71	15.65	14.25	15.00	14.04	15.33
1906	16.70	14.70	14.50	15.70	13.60	14.00	14.90
1907	17.90	15.30	15.10	17.00	15.10	15.10	15.80
1908	17.66	13.85	17.11	14.97	16.72	15.22	15.74
1909	17.61	14.24	17.00	15.51	15.88	15.09	16.10
1910	18.20	15.19	16.08	16.31	16.75	15.66	16.35
1911	18.95	15.44	14.59	16.20	14.23	15.16	15.89
1912	18.79	16.19	14.72	16.65	15.10	15.70	16.31
1913	18.04	14.92	15.82	15.44	14.10	14.85	15.78
1914[1]	18.46	15.35	15.78	17.27	(2)	15.51	16.38

[1] Figures for 1914 subject to slight revision.
[2] Included with "Other States."

During the 11 years covered by the table the beets in California tested above 17 per cent for 9 years. In Colorado they tested above 16 per cent only one year and above 15 per cent for 6 out of 11 years. In Utah and Idaho the sugar content reached 17 per cent for 2 years; it was above 15 per cent for 8 years out of 11. In Michigan the percentage reached 17 for 2 years and above 15 for 8 years out of 11. In Wisconsin a content of 16 per cent was reached for only 2 years and it was above 15 per cent for 6 years out of 10.

PURITY OF BEETS.—There is a considerable proportion of the weight of beets that consists of soluble solids, mostly sucrose, the chemical term for crystallizable sugar. If a ton of beets contains say 400 pounds of soluble solids and of these solids 360 pounds consist of sucrose then these beets are considered 90 per cent pure. Or, to put it another way, if the beets test 18 per cent sucrose and 20 per cent soluble solids, the per cent of purity, or as technically expressed the coefficient of purity, is equal to eighteen-twentieths, or 90 per cent. The relation of the sugar content to the soluble solids is very important because it is the measure of the purity of the beets. While it is thus important, it is not by itself a true test of the value of beets. Beets testing a very high per cent of sucrose with a moderately low per centage of purity will yield more sugar than beets testing a very low per cent of sucrose and a high percentage of purity. This fact is brought out strikingly in Table 7 (see p. 24), in which it is seen that the beets worked in Utah and Idaho average higher in purity than those in California, but the sugar extraction in California, as shown in Table 8 (see p. 25), is considerably higher than in Utah

and Idaho. This is because the beets in California have a much higher percentage of sucrose than those in Utah and Idaho.

The average purity of beets worked in the United States for each year from 1904 to 1914, inclusive, is shown in Table 7 below. In each of the 11 years shown in the table the purity showed an average above 82 per cent; for 9 years the average was above 83 per cent; and 3 years it was above 84 per cent.

TABLE 7.—AVERAGE PURITY COEFFICIENT OF BEETS USED IN THE UNITED STATES, BY STATES, 1904 TO 1914.

[Compiled from bulletins of the U. S. Department of Agriculture.]

Year.	California.	Colorado.	Michigan.	Utah and Idaho.	Wisconsin.	Other States.	United States.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	81.13	82.46	85.47	83.24	83.51	83.12	83.10
1905	81.33	81.79	84.67	82.58	83.00	81.10	83.00
1906	82.70	80.30	83.20	84.30	83.00	80.90	82.20
1907	85.10	81.50	84.70	87.20	85.60	82.30	83.60
1908	83.20	81.80	84.80	85.50	84.50	82.00	83.50
1909	83.62	80.51	86.21	85.20	85.17	83.21	84.11
1910	82.78	83.40	86.15	86.54	84.14	82.69	84.35
1911	82.04	81.22	80.00	86.79	81.00	84.51	82.21
1912	83.99	84.81	83.75	86.83	84.31	83.18	84.49
1913	86.26	84.01	82.61	84.65	.....	82.17	83.22
1914	82.70	84.22	82.85	86.28	(1)	83.46	83.89

[1] Included with "Other States."

The percentage of purity in Utah and Idaho exceeded the average for the United States 10 years out of 11. In Michigan the percentage exceeded the average for the United States 6 years out of 11 and was equal to the average in one other year. In Wisconsin the average exceeded that for the United States 5 years out of 9 and was equal to the average in one other year. In California and Colorado the average fell below the average for the United States 8 years out of 11.

The purity of the beets in California was above 83 per cent for 5 years out of 11. In Utah and Idaho it was above 84 per cent for 9 years, and it was above 85 per cent for 7 years during the period covered. In Michigan it was above 82 per cent 10 years out of an 11-year period. In Wisconsin it was above 82 per cent for 8 years out of 9. In the group including the other States the percentage of purity was above 82 per cent for 9 years out of 11. The percentage was below 81 per cent for 2 years in Colorado and 1 year in Michigan.

SUGAR EXTRACTION.—The real measure of the value of beets is the quantity of sugar that can be extracted in a reasonably efficient factory, and this should determine the price to be paid the farmer.

The beet grower, therefore, should be specially concerned in the quality of beets he produces, because this governs the amount of sugar that can be extracted and therefore the price he should receive.

The average extraction of sugar per ton of beets in the United States by States from 1904 to 1914, inclusive, is shown in Table 8 below:

TABLE 8.—AVERAGE EXTRACTION OF SUGAR PER TON OF BEETS USED IN THE UNITED STATES, BY STATES, 1904 TO 1914.

[Compiled from bulletins of the U. S. Department of Agriculture.]

Year.	California.	Colorado.	Michigan.	Utah and Idaho.	Wisconsin.	Other States.	United States.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	11.80	11.32	11.98	11.67	10.90	12.15	11.69
1905	14.37	10.47	12.50	10.80	11.49	10.66	11.74
1906	13.81	11.24	11.00	11.25	11.10	9.70	11.42
1907	15.06	11.11	12.16	13.81	12.35	11.37	12.30
1908	13.89	11.03	13.95	12.04	13.30	12.22	12.47
1909	14.43	11.89	12.93	11.13	12.01	12.10	12.56
1910	15.15	11.93	11.53	12.67	11.83	11.83	12.61
1911	15.55	13.04	8.69	12.95	9.23	11.16	11.84
1912	15.82	13.16	11.33	13.70	11.23	12.55	13.26
1913	15.05	12.46	12.82	12.33	11.01	12.25	12.96
1914	15.62	12.94	12.91	14.26	(1)	12.70	13.65

[1] Included with "Other States."

From the foregoing table it is seen that the average extraction for the United States fell below 12 per cent, or below 240 pounds per ton, for 4 years during the period covered. The highest percentage of extraction was 13.65 per cent in 1914–15. The extraction per ton in California is far above the average for the United States and considerably above the average for any other State. As already stated, this is due more to the high percentage of sugar in the beets grown in California than to the high percentage of purity. In Colorado the average exceeded the average for the United States but 1 year in 11. In Michigan it exceeded the average for the United States 4 years. In Utah and Idaho the average for the United States was exceeded 5 years. In Wisconsin the average exceeded that for the United States but 2 years out of 10.

SUMMARY OF YIELD AND QUALITY OF BEETS.—The data in Tables 5 to 8 have been brought together and shown in Table 9 below. This table also shows the acreage of beets harvested each year from 1904 to 1914, inclusive. The significant facts disclosed by this table have already been pointed out and they are brought together here merely for convenience in comparing the various elements affecting the quality of beets.

TABLE 9.—ACREAGE HARVESTED, AVERAGE YIELD PER ACRE, AVERAGE SUGAR CONTENT AND PURITY OF BEETS AND AVERAGE EXTRACTION, BY STATES, 1904–1914.

State and year.	Area harvested.	Average yield per acre.	Average sugar in beets.	Average purity coefficient of beets.[1]	Average extraction of sugar based on weight of beets sliced.
California:	*Acres.*	*Short tons.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	32,801	12.06	15.74	81.13	11.80
1905	51,857	9.92	17.27	81.33	14.37
1906	60,141	11.17	16.70	82.70	13.81
1907	47,387	10.23	17.90	85.10	15.06
1908	62,302	10.39	17.66	83.20	13.89
1909	83,000	10.63	17.61	83.62	14.43
1910	90,500	10.20	18.20	82.78	15.15
1911	99,545	10.42	18.95	82.04	15.55
1912	111,416	9.01	18.79	83.99	15.82
1913	127,610	8.92	18.04	86.26	15.05
1914	104,000	10.40	18.46	82.70	15.62
Colorado:					
1904	44,456	12.38	15.64	82.46	11.32
1905	85,916	10.19	14.71	81.79	10.47
1906	110,943	13.41	14.70	80.30	11.24
1907	127,678	11.93	15.30	81.50	11.11
1908	119,475	9.28	13.85	81.80	11.03
1909	121,698	10.33	14.24	80.51	11.89
1910	81,412	10.62	15.19	83.40	11.93
1911	86,437	11.07	15.44	81.22	13.04
1912	144,999	11.32	16.19	84.81	13.16
1913	168,410	10.93	14.92	84.01	12.46
1914	135,400	12.60	15.35	84.22	12.94
Michigan:					
1904	53,777	8.06	15.13	85.47	11.98
1905	77,823	6.83	15.65	84.67	12.50
1906	93,984	8.57	14.50	83.20	11.00
1907	88,334	7.89	15.10	84.70	12.16
1908	81,073	7.54	17.11	84.80	13.96
1909	112,232	7.31	17.00	86.21	12.93
1910	117,500	10.28	16.08	86.15	11.53
1911	145,837	9.90	14.59	80.00	8.69
1912	124,241	6.75	14.72	83.75	11.33
1913	107,965	8.85	15.82	82.61	12.82
1914	101,300	8.50	15.78	82.85	12.91
Utah and Idaho:					
1904	27,750	11.48	14.82	83.24	11.67
1905	44,550	8.25	14.25	82.58	10.80
1906	44,058	13.89	15.70	84.30	11.25
1907	54,601	10.94	17.00	87.20	13.81
1908	52,141	11.60	14.97	85.50	12.04
1909	46,727	13.24	15.51	85.20	11.13
1910	39,945	10.42	16.31	86.54	12.67
1911	51,002	12.72	16.20	86.79	12.95
1912	56,952	10.81	16.65	86.83	13.70
1913	61,969	11.37	15.44	84.65	12.33
1914	66,600	12.45	17.27	86.28	14.28

[1] Percentage of sucrose (pure sugar) in the total soluble solids of the beets.

TABLE 9.—ACREAGE HARVESTED, AVERAGE YIELD PER ACRE, AVERAGE SUGAR CONTENT AND PURITY OF BEETS AND AVERAGE EXTRACTION, BY STATES, 1904–1914—Continued.

State and year.	Area harvested.	Average yield per acre.	Average sugar in beets.	Average purity coefficient of beets.	Average extraction of sugar based on weight of beets sliced.
Wisconsin:	*Acres.*	*Short tons.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	9,500	11.37	14.54	83.51	10.90
1905	14,000	8.86	15.00	83.00	11.49
1906	15,560	10.19	13.60	83.00	11.10
1907	11,837	10.37	15.10	85.60	12.35
1908	14,700	9.37	16.72	84.50	13.30
1909	14,000	10.21	15.88	85.17	12.01
1910	16,772	9.14	16.75	84.14	11.82
1911	23,241	11.02	14.23	81.00	9.23
1912	20,172	10.27	15.10	84.31	11.23
1913	11,800	9.66	14.10	.....	11.01
1914[1]	.....	.....	.....	.....	.....
Other States:					
1904	29,500	9.01	15.36	83.12	12.15
1905	33,218	7.62	14.04	81.10	10.66
1906	51,388	9.76	14.00	80.90	9.70
1907	41,147	8.33	15.10	82.30	11.37
1908	35,222	8.65	15.22	82.00	12.22
1909	42,605	8.47	15.09	83.21	12.10
1910	51,900	9.29	15.66	82.69	11.83
1911	67,815	10.61	15.16	84.51	11.16
1912	97,520	9.40	15.70	83.18	12.55
1913	102,252	8.87	14.85	82.17	12.25
1914	76,100	10.70	15.51	83.46	12.70

[1] Included with "Other States."

TABLE 10.—ACREAGE HARVESTED, AVERAGE YIELD PER ACRE, AVERAGE SUGAR CONTENT AND PURITY OF BEETS AND AVERAGE EXTRACTION, FOR THE UNITED STATES, 1904–1914.

Year.	Area harvested.	Average yield per acre.	Average sugar in beets.	Average purity coefficient of beets.[1]	Average extraction of sugar based on weight of beets.
	Acres.	*Short tons.*	*Per cent.*	*Per cent.*	*Per cent.*
1904	197,784	10.47	15.33	83.10	11.69
1905	307,364	8.67	15.33	83.00	11.74
1906	376,074	11.26	14.90	82.20	11.42
1907	370,984	10.16	15.80	83.60	12.30
1908	364,913	9.36	15.74	83.50	12.47
1909	420,262	9.71	16.10	84.11	12.56
1910	398,029	10.17	16.35	84.35	12.61
1911	473,877	10.68	15.89	82.21	11.84
1912	555,300	9.41	16.31	84.49	13.26
1913	580,006	9.76	15.78	83.22	12.96
1914	483,400	10.90	16.38	83.89	13.65

[1] Percentage of sucrose (pure sugar) in the total soluble solids of the beets.

Section 4. Experimental results in beet growing.

As already stated the Federal Government and several of the States have devoted a great deal of time to experimenting in beet growing and in combating beet diseases and pests. The Federal Government through the Department of Agriculture has been particularly active in this respect. It has brought to this work the combined knowledge and skill of a corps of the very best scientific and practical agriculturists. The Government has conducted experiments under a great variety of conditions and has put to the test every factor affecting successful beet raising. It has experimented with different varieties of beets in various soils. It has tested fertilizers and methods of cultivation in numerous sections of the country and over a long period of years. By these experiments has been determined in what sections and under what conditions and by what methods the sugar beet can be most profitably grown. In the laboratories of the department these beets have been tested as to their value in the sugar factory. Furthermore, accounts have been kept as to the cost of production, and the profits per acre or per ton of beets have been determined. Many of these experiments have shown extraordinary results both as to yield and to quality. The results of this experimental work have been published in bulletins which are available to farmers interested in the subject.

It should be pointed out that those conducting the experiments for the Government have had every facility for obtaining the best results. Therefore the high yields and superior quality of beets produced under these circumstances can not be taken as results that the average farmer may reasonably expect. With these experimental results as examples of what may be done farmers in some sections of the country have been induced to engage in this branch of agriculture. Of course, very few, if any, have ever realized as good results as are shown by the best examples of the experimental work, but some of them have been very successful. This experimental work has been of great value to the beet grower and consequently to the beet-sugar industry.

II. COST AND PROFITS OF BEET GROWING.

Section 5. Methods employed in securing data.

In this investigation special agents visited farmers in the vicinity of every beet-sugar factory in the country with two or three exceptions. They had personal interviews with hundreds of farmers and secured data from about 500. In order to insure uniformity in the classification of items of expense the information was secured in schedule form. Thus data obtained from any farmer are comparable in most of the details with those secured from all others.

The various items of expense were classified and secured under the following heads:

Plowing.
Harrowing, rolling, and dragging.
Cost of seed.
Fertilizer.
Planting.
Cultivation (excluding hoeing).
Thinning, hoeing, weeding, and topping.
Plowing out, loading, and hauling.
Depreciation.[1]
Irrigation.
Miscellaneous.

The charge under the head "Miscellaneous" was principally for fighting pests, but it includes other items that could not well be assigned to any particular operation. In a majority of cases there was no expense under this head, and wherever it occurs at all it was very small. Some farmers charged repairs of implements under miscellaneous expense, but this item has been transferred to the particular operations in which the implements were used. In addition to the details of cost, the schedule called for the yield of beets per acre, the price received for beets, whether at the factory or at a receiving station on the railroad, and also for the value of the leaves or tops used for feeding cattle and sheep.

DIFFICULTIES DUE TO LACK OF RECORDS.—There were found very few growers who kept books of account from which could be obtained detailed information concerning the cost of growing beets. In order to arrive at a fair statement of costs it was necessary to ascertain the prevailing wages in the locality for men and the rate of pay for men and teams. Inquiry was made as to the rate of pay for a man and 2, 3, 4 or more horses and also as to the number of acres that a man and such a team could plow, harrow, plant, or cultivate in a day. From these statements it was comparatively easy to compute with reasonable accuracy the cost per acre for the several processes. In practically all the districts there were established prices per acre for the handwork done by contract. In some cases all or part of this handwork of blocking, thinning, hoeing, topping, and loading was done by special contracts or by the day. When done by the grower or members of his own family an allowance was made to correspond with the prevailing price for such work in the locality. Several of the beet-sugar companies grow beets on a large scale and keep complete records of the cost. It was generally found, however, that the

[1] The charge for depreciation has not been included in the tabulations for reasons stated elsewhere (see p. 32).

cost per acre for growing beets on a large scale by the sugar companies was considerably greater than when grown by small farmers. While two or three of the beet-sugar companies have been able to grow some beets at a cost as low or lower than they could be bought from farmers, a number of others have had an opposite experience. Thus, for instance, it cost one company $6.50 per ton to grow beets, and another $7.50, but both these companies were able to buy beets in the vicinity of their factories at $5.50. The beet-growing operations of still another company covering several years resulted in a cost ranging from $6.35 to about $12 per ton, while the company was able to buy beets during that time at $5 per ton. This high cost to the beet-sugar companies for growing beets is due partly to the fact that they use all of a large tract of land regardless of its adaptability to beets, while the small farmer generally uses only that portion of his farm that is best adapted to the growing of beets. Furthermore, the personal attention that the small farmer is able to give to beet growing gives him an advantage over the large grower who is dependent upon hired supervision and help exclusively.

Section 6. Representativeness and reliability of data.

Every effort was made to secure information that was both representative and reliable. Difficulties in the way of securing reliable data and the method employed to overcome these difficulties have already been pointed out. It was not possible to secure data that would show the average results of all the beet growers in any locality. While such results would represent conditions as they actually exist, they would not in fact represent fairly the reasonable probabilities of beet farming among ordinarily careful farmers planting land fairly well adapted to this crop. The figures presented are representative of the actual range of costs, and they show the results obtained under the various conditions prevailing in each locality.

REPRESENTATIVENESS OF THE INFORMATION SECURED.—The special agents were instructed to secure information from both large and small farmers in each locality. These instructions had in view the interviewing of a number of farmers in each locality representative of those cultivating more or less than the average acreage and those producing more or less than the average tonnage of beets per acre. Among those supplying information there was a number whose operations showed a loss. Wherever the data appeared to be reliable they were used regardless of whether they showed a profit or not. The results fall between the exceptionally good ones obtained by experiments made under the most favorable conditions and the exceptionally poor ones due to slovenly methods or to the use of soils not adapted to the crop.

Both large and small farmers are included, but the tables show no significant difference between their results. Speaking generally, the profitableness of beet growing does not appear to depend upon the acreage cultivated, but upon the adaptability of the land, the climatic conditions, upon the methods employed in cultivation, and upon irrigation in arid or semiarid regions.

An effort was made to secure information covering the three consecutive years 1911, 1912, and 1913. For various reasons many farmers could not supply information for all of the three years. No schedule was rejected, however, for this reason. If it seemed that a fairly accurate statement could be secured for only one year it was taken. Naturally more farmers were able to give figures for the latest year than for any other.

RELIABILITY OF DATA.—Excluding lifting and hauling, approximately 70 per cent of the labor expense in beet growing is on account of work done by hand. In practically every locality some farmers, and in many localities most of them, get this labor done at a contract price of so much per acre. A fair or customary rate of cost per acre for various operations with teams and implements was ascertained in the manner already explained. The cost of harvesting and marketing (lifting and hauling) can be determined with almost absolute accuracy. Thus the cost of labor, the principal element in beet growing, can be arrived at with reasonable exactness. The other elements of cost, such as seed, irrigation, fertilization, etc., constitute only from 10 to 15 per cent of the total cost, and most of them are easily ascertainable.

It is thus seen that the difficulties of determining agricultural costs in general are greatly reduced in the case of beets. Furthermore, the great expense incident to beet culture makes the farmer more careful to keep in touch with this part of his farming operations. Under these circumstances, and in view of the care exercised by the special agents in securing information, it is believed that the statistics of costs shown in this report are very reliable. Confidence in the accuracy of the figures is further strengthened by the fact that they are supported by many results obtained in the experimental work of the United States Department of Agriculture and by various State experiment stations.

After ascertaining the cost of growing it is easy to determine the profits. All farmers receive statements from the factories showing the prices paid for beets as they are delivered. In most cases these statements were available. In some cases where records of the price received had not been kept the agents had access to the records of the factories where the beets were sold, since many of the factories, in fact most of them, keep records of their purchases from each individual farmer.

Section 7. Classifying and tabulating data.

All schedules were carefully examined to correct clerical errors and to harmonize inconsistencies. There was sometimes a lack of uniformity in reporting such items of cost as fertilization, irrigation, freight on beets, planting and replanting, rent of machines, etc., but these were harmonized in the light of explanations made by the special agents. There was then made an almost literal transcription of the schedules in tabular form and defective schedules disclosed by this preliminary tabulation were rejected.

There were notations on a number of schedules from each district indicating the rental value of land. Since a charge for rent would be practically an estimated profit on the investment in land, this item was eliminated from the tabulation. Furthermore, there was such a wide variation in the estimated rental values due to differences in judgment and to location and quality of land as to make a presentation of the data of little value, and it would probably result in misleading deductions. In order to make all schedules comparable as to costs, cash and crop rentals paid by tenants have been disregarded. In some localities a large proportion of the crop is grown by tenants. The share rentals range from one-sixth to one-fourth of the amount received for the beets and part or all the tops. Cash rentals range from as low as $10 to sometimes as high as $40 per acre. The latter is exceptional, but $20 is not uncommon.

Depreciation involves questions so intricate as to make it impossible to arrive at a fair charge for this item. For example, many of the implements used in the cultivation of beets were also used in the cultivation of other crops. It was manifestly impossible to determine with any degree of accuracy what proportion of the value of these implements should be assigned to beets. Furthermore, in the West there was involved depreciation of irrigation plants, ditches, etc.

In some districts the farmer pays a portion of the freight on the beets from the loading station to the factory. For example, if the freight from a given point to the factory is 80 cents per ton the farmer may agree to pay 40 cents freight and the factory pays 40 cents. This amount of freight was charged in the schedule as an expense. This matter was adjusted by eliminating the freight charge from the cost statement and reducing the price received for beets by the same amount. Thus, if a farmer paid 30 cents per ton for freight and received $6.50 per ton for beets, the price was reduced by 30 cents per ton and the beets were credited at $6.20.

In the final tabulation certain items of cost were combined and the nomenclature was somewhat changed. Thus "plowing" and "harrowing, rolling, and dragging" were combined and these operations were tabulated under the head of "preparation of soil."

"Planting" and "cultivating" were also combined. The term "contract labor" was changed to read "hand labor" because hand labor was not contracted for in all cases, often being done by the farmer's own family. "Harvesting" was changed to read "lifting and hauling" because the topping and the loading are a part of the hand labor and in the case of contract labor is often included in the contract. Wherever the loading had been itemized separately it was deducted from the amount charged for "lifting and hauling" and added to "hand labor." The charges for fertilizing and irrigation were very carefully scrutinized in the light of the notations made by the special agents and these items were carefully adjusted so as to render the schedules comparable.

Beet tops have considerable money value as forage, but this varies in different localities and in different years for the same locality. It depends to some extent upon the volume or scarcity of forage crops in the community. In some sections, where there is considerable cattle and sheep feeding, there is always a demand for tops because of their fattening qualities. If there is little stock raising in the community the demand for tops is lighter. In the far northern districts frost and snow sometimes destroy tops or prevent their use for feeding purposes, but they always have a value as a fertilizer for the soil. In fact it is contended by some that their highest value is as a fertilizer, and such a use is recommended. Because of the widely varying value of tops, both actual and estimated, this item is a source of so much uncertainty that it was thought best to eliminate it.

Pulp was at one time an important item of profit to the farmer. Many factories allowed farmers free pulp up to a fixed percentage of his beet tonnage. All factories did not do this nor did all farmers use the pulp allowed them. The custom has grown less and less common until it is not now a generally important factor. For these reasons pulp has been disregarded as an element affecting the profits of the farmer.

Two tables are shown. The first includes all of the accepted schedules for those farmers reporting the results of their operations for the year 1913, while the second shows the results of those farms for which schedules were secured for the three years 1911, 1912, and 1913. The table for the year 1913 represents 453 farms and shows the cost in detail, the total expense and yield per acre, the amount of money received for the beets grown on each acre, and the profit per ton. The second table embraces the results of 214 farms and shows the average number of acres cultivated by each farmer for the three years, the average yield, the average expense per acre and per ton, and the average profit per acre and per ton. This table also

shows the average for all the farms in particular districts for the three years.

Section 8. Cost and profits of individual growers in 1913.

The costs and profits (or in some cases, losses) of 453 beet growers in the year 1913 are shown by Table 11 below. Of course the profits in any agricultural crop vary from year to year according to conditions. In some years the yield is greater than in others, and the quality is better in some years than others. Both these factors may affect the same crop. In fact, it is often the case that a poor yield is accompanied by a poor quality, but this is not always so. The result of a single year therefore will seldom if ever represent average results. It should be noted in this connection, however, that the year 1913 was generally considered in most districts, particularly in the West, as being about an average year. While the figures in Table 11 should not be taken as absolutely representative of general results in beet growing, they may be considered as fairly indicating what may be reasonably expected from year to year. Their most significant value, however, is in showing the general distribution of costs and the variation in the several items.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913.

OHIO-INDIANA DISTRICT.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
1	7.00	$3.00	$18.00	$2.50	$9.20	.....	$3.00	$1.50	.....	$37.20	$60.00	$22.80	12.00	$1.90
2	20.50	4.25	18.00	.50	10.00	.....	2.60	2.30	$0.45	38.10	67.16	29.06	12.10	2.40
3	6.50	4.50	18.00	3.00	13.50	.....	2.40	1.50	.50	43.40	70.00	26.60	14.00	1.90
4	35.00	3.50	18.00	3.50	8.60	.....	3.00	1.50	.....	38.10	55.00	16.90	11.00	1.54
5	1.75	4.50	18.00	3.85	5.50	.....	1.80	1.50	.....	35.15	35.36	.21	6.43	.03
6	40.31	5.00	18.00	2.50	5.62	.....	2.40	1.70	.30	35.52	38.65	3.13	7.73	.40
7	18.00	4.00	18.00	3.00	6.45	.....	.....	1.45	.....	32.90	31.69	[1] 1.21	6.34	[1] .19
8	27.50	5.25	18.00	4.50	7.00	.....	1.93	2.30	.....	38.98	46.70	7.72	9.25	.83
9	17.65	4.00	18.00	2.15	6.15	.....	6.45	1.80	.....	38.55	50.95	12.40	10.19	1.22
10	28.39	4.00	19.50	3.40	6.00	.....	2.35	1.73	.....	36.98	47.90	10.92	9.58	1.14
11	19.40	4.00	18.00	1.40	4.00	.....	3.89	1.50	.....	32.79	37.57	4.78	7.50	.64
12	27.90	3.50	19.00	2.40	8.00	.....	.....	1.50	.....	34.40	43.50	9.10	8.70	1.05
13	14.00	4.50	18.00	2.40	7.50	.....	.....	1.50	.....	33.90	56.50	22.60	11.30	2.00
14	16.88	3.50	18.00	2.90	8.60	.....	.....	1.50	.....	34.50	43.07	8.57	8.60	1.00
15	20.00	3.00	16.00	2.50	7.50	.....	1.80	1.20	.15	32.15	70.20	38.05	13.00	2.93
16	25.00	4.25	17.50	3.00	7.60	.....	.....	1.50	.15	34.00	61.60	27.60	11.00	2.51
17	4.00	4.50	18.00	3.00	9.70	.....	1.20	1.50	.45	38.35	51.25	12.90	10.25	1.26
18	10.00	3.50	18.00	3.50	6.90	.....	2.40	1.80	.45	36.55	45.00	8.45	9.00	.94

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

OHIO-INDIANA DISTRICT—Continued.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
19	13.00	$4.50	$18.00	$3.50	$10.75	.....	.....	$1.50	$0.15	$38.40	$66.25	$27.85	13.25	$2.10
20	12.00	5.00	18.00	3.00	12.30	.....	$1.15	1.50	.15	41.10	67.50	26.40	13.50	1.96
21	6.50	4.00	18.00	2.50	5.50	.....	3.00	2.25	.45	35.70	49.50	13.80	9.00	1.53
22	8.00	4.00	18.00	3.00	6.00	.....	2.80	1.50	.40	35.70	56.54	20.84	11.00	1.89
23	32.00	3.50	18.00	2.50	10.30	.....	.....	1.60	.30	36.20	70.00	33.80	14.00	2.41
24	22.00	4.25	18.00	3.00	7.00	.....	1.43	1.50	.10	35.28	34.16	[1] 1.12	6.45	[1] .17
25	12.00	4.50	16.00	3.00	9.80	.....	1.80	1.50	.15	36.75	66.30	29.55	13.00	2.27
26	12.00	4.50	18.00	3.50	11.80	.....	1.20	1.50	.45	40.95	73.20	32.25	12.00	2.69
27	20.00	4.00	18.00	3.00	7.50	.....	2.40	1.50	.30	36.70	50.00	13.30	10.00	1.33
28	13.00	3.50	18.00	3.00	5.70	.....	3.00	1.80	.15	35.15	38.50	3.35	7.00	.48
29	4.00	4.25	18.00	3.00	11.60	.....	1.80	1.50	.30	40.45	76.87	36.42	13.90	2.62
30	14.00	4.50	18.00	3.00	9.80	.....	2.40	1.50	.25	39.45	57.75	18.30	11.00	1.66
MICHIGAN, LOWER PENINSULA.														
31	9.50	$7.00	$18.00	$2.40	$5.75	.....	.....	$2.25	.....	$35.40	$57.18	$21.78	$10.00	$2.14
32	4.94	5.75	18.00	4.00	10.00	.....	.....	2.70	.....	40.45	83.69	43.24	14.70	24.4
33	18.75	7.00	18.00	4.50	18.00	.....	.....	2.25	$0.50	50.25	56.64	6.39	10.00	.69
34	38.60	5.00	18.00	3.75	7.50	.....	$2.00	3.00	.....	39.25	62.90	23.65	11.43	2.07
35	4.00	7.00	16.00	4.00	8.25	.....	5.00	2.70	.....	42.95	65.33	23.38	12.65	1.70
36	21.60	4.25	18.00	3.50	10.25	.....	3.50	2.70	.....	42.20	56.90	14.70	10.50	1.42
37	26.50	4.25	20.00	3.00	9.75	.....	2.00	2.25	.....	41.25	63.28	22.03	11.50	1.98
38	4.50	4.55	20.00	4.05	11.75	.....	1.75	2.70	.....	44.80	81.17	36.37	14.10	2.53
39	8.00	7.50	20.00	2.55	13.50	.....	1.80	2.55	.....	47.90	65.45	17.55	11.50	1.53
40	2.00	4.25	16.00	3.00	10.00	.....	2.50	2.25	.....	38.00	70.26	32.26	13.30	2.43
41	24.00	4.25	20.00	2.25	7.25	.....	2.80	2.25	.....	38.80	71.40	32.60	14.00	2.33
42	7.50	5.05	16.00	4.60	9.65	.....	1.75	2.25	.....	39.30	68.24	28.94	13.00	2.29
43	6.70	3.50	18.00	4.40	11.00	.....	3.00	3.00	.50	43.40	60.46	17.06	10.10	1.60
44	2.31	4.00	16.00	3.95	13.25	.....	3.00	2.25	.....	42.45	80.01	37.56	13.43	2.80
45	3.47	4.00	15.00	3.50	9.50	.....	.....	2.25	.....	34.25	59.68	25.43	12.11	2..1
46	4.60	3.00	15.00	2.60	7.00	.....	2.20	1.80	.....	31.60	57.66	26.06	10.70	2.04
47	8.84	4.00	16.50	5.50	12.00	.....	2.00	2.25	.25	42.50	42.20	[1] .30	8.26	[1] .25
48	8.12	2.75	15.00	3.90	4.75	.....	1.65	2.25	.....	30.30	13.48	[1]16.82	2.69	[1] 6.67
49	9.36	6.00	16.00	10.50	12.00	.....	.....	2.25	.50	47.25	53.81	6.56	10.69	.92
50	37.00	4.10	18.00	3.60	7.75	.....	5.00	2.25	.25	40.95	51.32	10.37	11.22	184
51	49.76	4.50	18.00	4.65	8.20	.....	.70	2.44	1.00	39.49	31.89	[1] 7.60	7.33	[1] 1.01
52	8.79	6.25	16.00	6.40	14.50	.....	1.50	2.50	.....	47.15	65.16	18.01	11.88	1.52
53	33.00	4.75	18.00	6.01	9.30	.....	2.20	2.68	.....	42.94	66.08	23.14	11.79	1.96
54	18.00	5.00	16.00	7.50	13.63	.....	2.25	2.87	.25	47.50	62.06	14.56	11.43	1.27
55	9.08	5.00	16.00	5.50	8.00	.....	3.00	2.25	.50	40.25	57.69	17.44	10.40	1.68
56	4.59	9.00	16.00	5.00	6.50	.....	.....	2.25	.50	39.25	48.78	9.53	9.31	1.02
57	19.84	3.75	16.00	5.80	7.50	.....	3.00	2.25	.25	38.55	65.05	26.50	11.56	2.29
58	100.00	5.55	18.00	2.50	6.50	.....	2.50	2.25	2.00	39.30	44.73	5.43	8.06	.67
59	18.00	4.00	18.00	4.40	7.25	.....	.....	1.80	.50	35.95	53.68	17.73	9.50	1.87
60	6.00	5.00	18.00	4.50	6.00	.....	.....	2.25	1.00	36.75	50.00	13.25	9.50	1.39

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

MICHIGAN, LOWER PENINSULA—Continued.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed	Miscellaneous.	Total expenses.				
													Tons.	
61....	12.00	2.75	$18.00	$3.50	$8.50	.....	$2.10	$2.25	$0.50	$37.60	$52.25	$14.65	9.50	$1.54
62....	14.50	6.50	18.00	3.50	10.00	.....	2.10	2.25	1.00	43.35	77.18	33.83	13.00	2.60
63....	12.00	4.00	17.17	2.50	5.00	.....	.....	2.25	.50	31.42	39.74	8.32	7.50	1.11
64....	30.00	2.00	18.00	4.00	9.75	.....	1.65	1.80	.50	37.70	58.75	21.05	10.25	2.05
65....	22.00	4.50	18.00	3.60	9.00	.....	.....	2.25	.....	37.35	68.94	31.59	11.92	2.65
66....	7.80	3.50	16.00	2.90	6.50	.....	.....	2.25	.....	31.15	50.08	18.93	9.45	2.00
67....	24.00	3.50	19.00	3.00	8.00	.....	.....	4.00	1.00	38.50	38.00	[1].50	7.30	[1].07
68....	44.00	5.00	18.00	3.50	7.00	.....	1.20	2.25	.30	27.25	53.00	15.75	10.00	1.58
69....	19.25	3.00	20.00	3.10	4.00	.....	1.20	2.25	.....	33.55	27.60	[1]5.95	5.02	[1]1.19
70....	7.00	3.25	16.00	4.50	7.00	.....	1.20	1.80	.50	34.25	54.08	19.83	10.30	1.93
71....	2.00	6.50	18.00	3.40	6.50	.....	1.50	2.25	.....	38.15	23.55	[1]14.60	4.66	[1]3.13
72....	10.00	7.00	20.00	3.50	7.50	.....	2.90	3.00	.50	44.40	20.71	[1]23.69	3.82	[1]6.20
73....	35.00	4.40	18.00	3.25	8.00	.....	1.75	2.25	.....	37.65	74.67	37.02	14.50	2.55
74....	2.50	5.50	20.00	4.00	6.60	.....	.....	1.50	.50	38.10	47.60	9.50	7.32	1.30
75....	24.00	6.50	20.00	5.00	11.00	.....	.....	2.25	.50	45.25	53.62	8.37	9.00	.93
76....	6.50	3.75	19.00	5.25	10.00	.....	1.50	2.25	.50	42.25	57.92	15.67	9.36	1.67
77....	4.50	5.10	20.00	3.00	5.90	.....	.....	2.53	.....	36.53	70.81	34.28	13.00	2.64
78....	14.00	5.00	18.00	3.25	8.00	.....	2.80	2.25	.70	40.00	83.20	43.20	14.44	2.99
79....	5.50	5.50	17.00	4.50	9.50	.....	.....	2.25	1.00	39.75	55.65	15.90	8.78	1.81
80....	13.00	5.00	20.00	2.90	11.50	.....	1.00	2.25	.....	42.65	51.65	9.00	9.73	.92
81....	11.75	5.50	18.00	4.50	13.00	.....	3.00	2.25	1.50	47.75	51.60	3.85	10.00	.39
82....	4.50	9.00	18.00	2.65	11.25	.....	4.50	2.25	.....	47.65	66.00	18.35	11.00	1.67
83....	30.00	5.00	20.00	4.50	12.25	.....	6.00	2.70	.25	50.70	59.65	8.95	10.00	.90
84....	21.25	5.00	22.00	4.25	13.00	.....	2.80	2.25	.50	49.80	63.30	13.50	10.05	1.34
85....	26.50	4.50	22.00	4.25	15.00	.....	1.00	2.25	.25	49.25	76.83	27.58	12.12	2.28
86....	28.00	8.00	20.00	3.00	15.00	.....	2.25	2.70	.50	51.45	66.59	15.14	10.82	1.40
87....	10.00	4.50	20.00	5.50	11.50	.....	1.50	1.80	.....	44.80	60.33	15.53	11.00	1.41
88....	13.00	4.50	20.00	3.50	6.50	.....	3.00	2.25	.50	40.25	37.20	[1]3.05	6.00	[1].51
89....	4.00	5.00	18.00	3.50	12.75	.....	7.50	2.25	.50	49.50	75.45	25.95	13.20	1.97
90....	31.00	4.25	22.00	5.50	16.00	.....	3.00	2.25	.25	53.25	84.86	31.61	14.00	2.26
91....	11.00	4.50	20.00	2.25	10.75	.....	5.00	2.25	.....	44.75	55.76	11.01	8.50	1.30
92....	1.00	4.50	18.00	5.75	8.00	.....	6.00	2.25	.....	44.50	88.82	44.32	17.86	2.48
93....	3.25	5.00	20.00	2.00	8.50	.....	5.00	2.25	.50	43.25	77.50	34.25	13.35	2.57
94....	23.60	4.75	18.00	3.50	6.80	.....	2.25	2.40	.25	37.95	59.64	21.69	11.76	1.84
95....	6.87	4.50	18.00	3.50	8.25	.....	1.35	2.40	.....	38.00	66.73	28.73	12.37	2.32
96....	14.68	2.60	20.00	3.50	8.75	.....	6.00	2.25	.....	43.10	76.40	33.30	12.95	2.57
97....	15.15	4.00	18.00	2.90	6.00	.....	8.10	2.25	.....	41.25	21.94	[1]19.31	4.07	[1]4.74
98....	6.85	4.50	20.00	3.50	9.50	.....	1.95	3.00	.....	42.45	56.79	14.34	9.13	1.57
99....	6.45	4.50	20.00	3.50	9.50	.....	1 95	3.00	.....	42.45	49.50	7.05	8.25	.85
100...	7.00	3.75	18.00	3.20	3.75	.....	1.35	2.25	.....	32.30	42.32	10.02	7.16	1.40
101...	15.31	4.50	18.00	3.15	7.05	.....	5.85	2.40	.....	40.95	55.84	14.89	10.26	1.45
102...	49.00	4.60	20.00	3.00	8.50	.....	1.50	3.00	.....	40.60	75.30	34.70	14.00	2.48
103...	45.00	6.80	20.00	3.00	10.50	.....	4.80	2.70	1.00	48.80	67.00	18.20	10.54	1.73
104...	8.00	6.00	20.00	3.50	13.50	.....	5.90	2.25	.....	51.15	76.37	25.22	11.83	2.13
105...	7.00	5.50	22.00	3.60	14.00	.....	6.00	2.70	.....	53.80	70.00	16.20	12.00	1.35
106...	3.50	4.75	18.00	7.50	9.75	.....	8.00	1.70	.....	49.70	56.55	6.85	8.93	.77

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

MICHIGAN, LOWER PENINSULA—Continued.

Farm number.	Acres.	Cost per acre.								Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
												Tons.	
107...	3.00	4.00	$18.00	$6.00	$5.25	.....	$7.00	$1.50	.....	$41.75	$27.51	[1] 14.24	4.46	[1] $3.19
108...	2.00	7.00	18.00	5.00	10.50	.....	4.75	1.50	.....	46.75	26.75	[1] 20.00	5.19	[1] 3.85
109...	2.25	3.25	16.00	2.80	11.71	.....	6.30	1.40	.....	41.46	34.81	[1] 6.65	5.90	[1] 1.13
110...	3.00	4.00	18.00	3.40	9.17	.....	10.30	1.66	.....	46.53	44.25	[1] 2.28	7.12	[1] .32
111...	8.00	4.25	20.00	3.75	10.00	.....	10.00	2.25	.....	50.25	85.95	35.70	17.19	2.08
112...	7.00	3.50	20.00	6.00	5.75	.....	10.00	1.80	.....	47.05	49.10	2.05	9.82	.21
113...	10.00	3.50	20.00	5.70	5.10	.....	10.00	2.25	.....	46.55	37.25	[1] 9.30	7.45	[1] 1.25
114...	8.00	4.00	20.00	3.50	11.25	.....	9.00	1.20	.....	48.95	90.65	41.70	18.13	2.30
115...	9.00	4.50	18.00	5.00	6.00	.....	9.00	2.25	.....	44.75	45.68	.93	9.10	.10
116...	17.00	5.00	20.00	5.50	7.50	.....	5.00	2.25	.....	45.25	36.00	[1] 9.25	7.20	[1] 1.28
117...	12.00	4.00	9.59	3.00	3.50	.....	1.50	3.75	$1.00	26.34	20.63	[1] 5.71	3.23	[1] 1.77
118...	2.75	4.00	20.00	2.70	12.00	.....	1.80	3.00	.....	43.50	88.00	44.50	13.06	3.41
119...	4.35	4.00	20.00	3.50	10.50	.....	.....	3.00	.....	41.00	60.51	19.51	9.04	2.16
120...	14.35	4.00	20.00	2.40	9.50	.....	2.45	3.00	.....	41.35	49.35	8.00	7.56	1.06
121...	4.95	4.25	20.00	3.00	8.50	.....	7.20	3.00	.....	45.95	52.77	6.82	7.95	.86
122...	6.51	7.50	18.00	3.00	16.82	.....	5.00	2.62	.....	52.94	87.40	34.46	14.54	2.37
123...	5.10	4.50	19.00	5.70	15.30	.....	3.00	2.25	.....	49.75	60.12	10.37	9.75	1.06
124...	2.43	4.50	15.00	11.00	16.85	.....	9.00	2.25	.....	58.60	74.21	15.61	12.29	1.27
125...	11.14	4.00	19.00	2.45	9.00	.....	2.25	2.25	.....	38.95	47.06	8.11	8.79	.92
126...	17.72	4.25	18.00	3.75	9.06	.....	2.25	2.25	.....	39.56	64.31	24.75	11.34	2.18
127...	6.90	2.50	20.00	3.40	10.25	.....	2.50	2.25	.....	40.90	70.70	29.80	13.05	2.28
WISCONSIN, NORTHERN DISTRICT.														
128...	2.00	$6.25	$20.00	$10.00	$7.50	.....	$2.00	$2.25	.....	$48.00	$78.00	$30.00	13.00	$2.31
129...	1.50	5.00	20.00	7.00	8.17	.....	3.75	2.70	.....	46.62	80.00	33.38	13.33	2.50
130...	2.00	4.00	20.00	5.00	10.75	.....	4.50	2.70	.....	46.95	78.00	31.05	13.00	2.39
131...	1.75	3.00	21.00	4.00	7.00	.....	.....	3.00	$0.25	38.25	72.00	33.75	12.00	2.81
132...	2.00	5.00	21.00	5.75	14.85	.....	2.50	3.00	.....	52.10	54.00	1.90	9.00	.21
133...	3.50	6.00	8.50	4.00	16.70	.....	13.25	3.00	.....	51.45	102.00	50.55	17.00	2.97
134...	5.75	3.50	21.00	6.00	11.50	.....	3.50	2.25	.....	47.75	57.00	9.25	9.50	.97
135...	2.00	3.00	21.00	3.60	10.38	.....	.....	2.40	.50	40.88	77.00	36.12	12.83	2.82
136...	3.00	5.20	21.00	5.00	11.50	.....	.....	1.80	.....	44.50	60.00	15.50	10.00	1.55
137...	13.25	4.50	21.00	4.50	6.00	.....	.....	2.25	.25	38.50	42.00	3.50	7.00	.50
138...	6.50	6.25	21.00	7.00	9.45	.....	.....	2.25	.60	46.55	64.50	17.95	10.75	1.67
139...	18.50	3.50	21.00	2.50	11.50	.....	.....	1.80	.25	40.55	72.00	31.45	12.00	2.62
140...	7.00	5.00	21.00	2.75	10.25	.....	.....	2.25	.40	41.65	66.00	24.35	11.00	2.21
141...	2.00	2.50	12.50	3.75	7.75	.....	.50	2.25	.....	29.25	54.00	24.75	9.00	2.75
142...	10.00	3.00	20.00	2.90	7.50	.....	4.00	2.25	.....	39.65	40.00	.35	8.00	.04
143...	22.50	3.00	20.00	5.50	7.00	.....	.....	2.55	.....	38.05	56.65	18.60	11.00	1.69
144...	70.00	3.50	20.00	2.00	6.75	.....	2.00	2.70	.....	36.95	54.08	17.13	10.50	1.63
145...	19.50	5.00	20.00	4.00	6.00	.....	.....	2.70	.....	37.70	46.35	8.65	9.00	.96
146...	14.50	3.00	20.00	3.00	6.00	.....	.....	2.70	.50	35.20	40.00	4.80	8.00	.60

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

WISCONSIN, SOUTHERN DISTRICT.

Farm number.	Acres.	Cost per acre.								Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.			Tons.	
147...	2.50	$6.50	$21.00	$3.50	$12.25	.....	.....	$2.70	$0.30	$46.25	$84.50	$38.25	13.00	$2.94
148...	2.50	3.50	21.00	3.90	10.25	.....	.....	2.25	.....	40.90	107.25	66.35	16.50	4.02
149...	6.00	6.00	21.00	3.50	13.50	.....	.....	2.25	.....	46.25	91.00	44.75	14.00	3.20
150...	15.00	5.75	21.00	3.00	8.50	.....	.....	2.25	.....	40.50	66.00	25.50	12.00	2.13
151...	2.00	3.75	21.00	3.50	16.00	.....	.....	2.25	.....	46.50	110.00	63.50	20.00	3.18
152...	3.00	4.50	21.00	7.00	10.35	.....	.....	2.25	.....	45.10	51.75	6.65	9.00	.74
153...	5.00	3.00	19.00	3.00	8.00	.....	$2.50	2.25	.....	37.75	66.00	28.25	12.00	2.35
154...	2.00	6.00	21.00	5.00	8.50	.....	.....	2.25	.....	42.75	71.50	28.75	13.00	2.21
MINNESOTA.														
155...	1.25	$2.50	$20.00	$6.25	$7.00	.....	$2.00	$1.80	.....	$39.55	$44.00	$4.45	8.00	$0.56
156...	5.00	4.00	20.00	3.00	13.00	.....	3.00	1.80	.....	44.80	88.00	43.20	16.00	2.70
157...	3.00	3.00	20.00	5.25	10.25	.....	3.50	2.50	.....	44.50	49.50	5.00	9.00	.56
158...	1.75	2.00	20.00	5.75	16.00	.....	10.00	2.30	.....	56.05	82.50	26.45	15.00	1.76
159...	3.00	6.00	20.00	2.90	6.60	.....	5.00	2.00	.....	42.50	38.50	[1] 4.00	7.00	[1] .57
160...	13.00	3.00	20.00	3.40	5.40	.....	3.75	2.00	$0.75	38.30	91.25	52.95	18.25	2.90
161...	3.00	3.00	20.00	4.00	7.32	.....	4.00	1.00	.....	39.32	38.75	[1] .57	7.75	[1] .07
162...	9.50	4.00	20.00	5.20	8.75	.....	.....	1.20	.....	39.15	35.00	[1] 4.15	7.00	[1] .59
163...	6.00	3.00	20.00	2.00	3.79	.....	10.00	2.00	.....	40.79	48.75	7.96	9.75	.82
164...	11.00	2.00	20.00	4.30	9.40	.....	3.20	1.50	.25	40.65	60.00	19.35	12.00	1.61
165...	5.00	3.50	20.00	3.25	14.00	.....	.....	1.80	.....	42.55	60.00	17.45	12.00	1.45
IOWA.														
166...	21.00	$2.00	$20.00	$1.75	$6.35	.....	$2.10	$1.50	.....	$33.70	$62.50	$28.80	12.50	$2.30
167...	175.00	2.00	20.00	4.00	6.50	.....	1.40	1.20	.....	35.10	55.00	19.90	11.00	1.81
168...	24.00	2.50	19.50	3.40	4.25	.....	1.25	1.80	.....	32.70	37.50	4.80	7.50	.64
169...	11.00	2.00	18.00	4.87	7.35	.....	.....	1.50	.....	33.72	48.60	14.88	9.00	1.65
170...	4.75	2.25	19.00	3.50	10.69	.....	1.25	1.50	.....	38.19	71.55	33.36	13.25	2.52
171...	7.00	2.25	19.00	7.75	5.05	.....	1.25	1.50	.....	36.80	29.70	[1] 7.10	5.50	[1] 1.29
172...	15.00	2.00	17.50	3.40	3.90	.....	.63	1.50	.....	28.93	35.00	6.07	7.00	.87
173...	100.00	2.80	15.50	3.75	4.65	.....	1.25	1.60	.....	29.55	32.50	2.95	6.50	.45
174...	19.00	2.00	16.00	3.15	3.50	.....	1.40	1.30	.....	27.35	30.00	2.65	6.00	.44
NEBRASKA, GRAND ISLAND DISTRICT.														
175...	3.00	$2.24	$7.75	$5.00	$3.25	.....	.....	$2.55	.....	$20.79	$15.00	[1] $5.79	3.00	[1] $1.93
176...	5.00	2.18	10.00	3.44	5.10	.....	$8.00	1.20	.....	29.92	30.00	.08	6.00	.01
177...	7.50	2.13	15.33	1.99	7.02	.....	2.33	2.00	.....	30.80	45.00	14.20	9.00	1.58
178...	5.00	2.45	13.00	2.93	2.51	.....	.75	2.00	.....	23.64	30.00	6.36	6.00	1.06
179...	8.00	3.40	22.00	2.25	6.20	.....	.....	2.00	.....	35.85	40.00	4.15	8.00	.52
180...	14.00	3.36	10.30	2.85	5.81	$4.13	.75	2.00	.....	29.20	40.00	10.80	8.00	1.35
181...	5.00	3.33	16.70	2.35	4.95	.....	3.33	2.00	.....	32.66	20.00	[1] 12.66	4.00	[1] 3.17

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

NEBRASKA, GRAND ISLAND DISTRICT—Continued.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
182...	5.50	$3.02	$9.10	$3.45	$5.10	.....	$3.00	$2.00	.....	$25.67	$30.00	$4.33	6.00	$0.72
183...	5.00	1.98	16.00	4.28	8.25	.....	.....	1.30	.....	31.81	45.00	13.19	9.00	1.47
184...	15.00	3.30	11.60	2.40	5.33	$3.00	.....	2.00	.....	27.63	20.00	[1] 7.63	4.00	[1] 1.91
185...	6.00	4.82	10.52	3.33	7.43	3.01	1.80	2.00	.....	32.91	61.00	28.09	12.20	2.30
186...	28.75	2.25	20.00	2.00	3.21	.....	1.00	1.75	.....	30.21	17.50	[1] 12.71	3.50	[1] 3.63
187...	15.00	4.80	17.65	2.20	8.20	2.99	3.11	1.70	.....	40.65	70.00	29.35	14.00	2.10
188...	15.00	2.70	10.28	1.67	5.82	4.15	2.75	1.80	.....	29.17	77.50	48.33	15.50	3.12
KANSAS.														
189...	41.50	$4.91	$15.25	$2.62	$5.11	$0.72	.....	$2.00	$0.18	$30.79	$46.20	$15.41	8.40	$1.83
190...	45.00	4.05	15.00	3.90	3.95	2.40	.....	1.70	.....	31.00	19.25	[1] 11.75	3.50	[1] 3.36
191...	8.00	3.02	6.88	1.98	1.79	.22	.....	1.60	.75	16.24	13.75	[1] 2.49	2.50	[1] 1.00
192...	28.00	4.96	16.00	2.59	5.60	1.60	.....	1.80	.....	32.55	52.80	20.25	9.60	2.11
193...	36.00	4.27	15.00	1.63	3.54	2.08	.....	2.00	.....	28.52	39.60	11.08	7.20	1.54
COLORADA, NORTHERN DISTRICT.														
194...	31.00	$4.50	$20.00	$2.40	$9.15	$2.60	$6.50	$2.00	.....	$47.15	$97.38	$50.23	19.00	$2.64
195...	62.00	5.00	20.00	3.40	10.90	4.85	4.50	2.00	.....	50.65	108.00	57.35	18.00	3.19
196...	28.00	6.00	20.00	1.58	8.11	2.60	4.30	2.00	$0.18	44.77	104.28	59.51	19.40	3.07
197...	30.00	5.00	20.00	3.20	13.30	4.69	5.00	2.00	.....	53.19	105.30	52.11	18.00	2.90
198...	20.00	4.50	20.00	2.35	12.56	1.50	1.60	1.50	.....	44.01	75.77	31.76	13.41	2.37
199...	65.00	3.26	20.00	3.35	10.00	5.93	15.82	2.00	.....	60.36	84.00	23.64	16.00	1.48
200...	35.00	3.50	20.00	2.65	13.48	1.50	13.00	1.60	.....	55.73	107.97	52.24	18.30	2.85
201...	76.00	4.00	20.00	2.92	9.66	4.75	11.58	1.50	.....	54.41	71.90	17.49	13.32	1.31
202...	22.00	2.70	16.50	2.90	13.47	1.80	.....	2.00	.....	39.37	81.00	41.63	12.00	3.47
203...	69.00	3.75	20.00	3.40	11.33	2.50	2.32	1.50	.14	44.94	84.38	39.44	15.00	2.63
204...	30.00	4.25	20.00	2.90	16.50	1.05	13.00	1.50	.....	59.20	75.00	15.80	15.00	1.05
205...	56.00	3.30	20.00	1.85	9.20	.50	5.00	2.00	.58	42.43	104.40	61.97	18.00	3.44
206...	16.50	6.72	20.00	5.20	19.50	3.74	12.25	2.00	.....	69.41	90.75	21.34	16.50	1.29
207...	33.00	4.08	23.00	2.40	12.50	3.40	11.00	2.00	.....	58.38	124.00	65.62	23.33	2.81
208...	13.00	5.10	20.00	2.50	9.30	3.10	7.67	2.00	.....	49.67	78.00	28.33	13.00	2.18
209...	20.00	3.50	20.00	3.50	6.50	4.75	7.00	2.00	.....	47.25	60.00	12.75	10.00	1.28
210...	12.50	4.00	20.00	2.50	12.32	1.75	11.50	2.00	.....	54.07	80.96	26.89	16.00	1.68
211...	27.00	3.00	20.00	2.50	9.50	3.00	4.00	2.00	.....	44.00	84.00	40.00	15.00	2.67
212...	40.00	4.00	20.00	2.90	7.00	2.00	2.00	2.00	.80	40.70	45.00	4.30	9.00	.48
213...	65.00	4.50	20.00	2.00	7.40	1.30	1.00	2.00	.....	38.20	50.00	11.80	10.00	1.18
214...	58.50	4.00	20.00	1.50	8.25	1.25	1.30	2.00	.....	38.30	62.50	24.20	12.50	1.94
215...	40.00	8.89	20.00	3.50	8.80	1.90	1.50	2.00	.....	46.59	75.60	29.01	14.00	2.07
216...	42.00	5.25	20.00	3.95	7.80	6.85	1.30	2.00	.....	47.15	61.50	14.35	12.00	1.20
217...	60.00	6.00	20.00	3.50	8.50	5.75	2.00	2.00	.....	47.75	60.00	12.25	12.00	1.02
218...	39.61	4.80	20.00	2.90	16.10	5.12	3.00	2.00	.20	54.12	80.00	25.88	16.00	1.62
219...	12.00	4.00	4.83	3.50	14.02	6.53	4.40	2.00	.40	39.68	98.04	58.36	19.00	3.07

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

COLORADO, NORTHERN DISTRICT—Continued.

Farm number.	Acres.	Cost per acre.								Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
												Tons.	
220...	50.00	$7.20	$20.00	$3.30	$6.70	$6.00	$1.75	$2.00	.....	$46.95	$60.00	$13.05	12.00	$1.09
221...	33.00	4.00	20.00	2.35	9.65	1.60	1.50	2.00	.....	41.10	62.43	21.33	11.00	1.94
222...	65.50	3.40	20.00	3.00	6.80	4.60	.90	2.00	.....	40.70	61.50	20.80	12.00	1.73
223...	5.50	5.25	16.00	2.80	7.50	4.57	5.00	1.50	.....	42.62	55.00	12.38	10.00	1.24
224...	60.00	8.80	20.00	3.33	9.00	1.60	.....	2.50	.....	45.23	56.38	11.15	11.00	1.01
225...	122.00	3.40	20.00	1.70	9.70	5.90	.90	2.00	.....	43.60	61.50	17.90	12.00	1.49
226...	45.00	5.00	20.00	2.50	9.60	5.50	.45	2.00	.....	45.05	60.50	15.45	11.00	1.40
227...	20.00	4.10	20.00	2.10	11.13	3.10	.....	2.00	.....	42.43	66.13	23.70	11.50	2.06
228...	36.00	6.50	20.00	4.50	14.94	2.39	.....	2.00	.....	50.33	82.35	32.02	15.25	2.10
229...	60.00	3.80	20.00	2.50	7.00	.80	.....	2.00	.....	36.10	52.50	16.40	10.00	1.64
230...	40.00	4.60	20.00	3.00	9.75	1.85	.50	2.65	.....	42.35	74.25	31.90	13.50	2.36
231...	13.00	16.55	9.60	3.90	12.85	4.00	2.30	1.00	.....	50.20	75.00	24.80	15.00	1.65
232...	38.90	4.60	20.00	2.33	8.10	7.44	.....	2.00	.....	44.47	70.00	25.53	14.00	1.82
233...	76.00	5.75	20.00	4.35	8.80	.60	1.19	2.00	.....	42.69	50.40	7.71	9.00	.86
234...	41.00	6.67	20.00	3.95	8.63	4.18	2.44	2.51	.....	48.38	73.50	25.12	14.00	1.79
235...	8.00	3.50	17.00	4.50	5.50	2.08	.....	2.00	.....	34.58	38.50	3.92	7.00	.56
236...	35.00	3.30	20.00	.90	8.00	2.88	.....	1.70	.....	36.78	63.00	26.22	12.00	2.19
237...	22.00	4.00	20.00	3.15	11.00	2.10	5.00	2.00	$1.00	48.25	88.00	39.75	16.00	2.48
238...	39.50	4.59	20.00	3.00	11.57	2.25	4.00	1.30	.....	46.71	94.07	47.36	16.65	2.84
239...	13.00	3.85	20.00	2.00	10.00	.90	.....	1.70	.....	38.45	110.00	71.55	20.00	3.58
240...	34.00	4.35	20.75	1.80	9.02	3.00	.....	1.50	.....	40.42	71.02	30.60	13.25	2.31
241...	22.00	5.10	20.00	3.00	8.90	2.36	5.00	1.50	.....	45.86	84.00	38.14	16.00	2.38
242...	20.00	3.90	20.00	5.50	12.00	1.50	.....	2.00	1.25	46.15	64.50	18.35	12.00	1.53
243...	50.00	6.33	20.00	2.80	12.70	1.20	5.60	2.00	.....	50.63	89.25	38.62	17.00	2.27
244...	25.00	3.90	20.00	3.40	6.50	1.50	1.60	1.70	.....	38.60	38.50	[1].10	7.00	[1].01
245...	100.00	6.00	20.00	4.75	13.00	6.25	2.00	2.00	.50	54.50	70.20	15.70	13.00	1.21
246...	60.00	3.96	20.00	1.93	7.90	4.70	1.66	2.00	.....	42.15	84.00	41.85	16.00	2.62
247...	17.50	4.40	20.00	3.35	8.40	3.18	1.30	1.00	.....	41.63	84.00	42.37	16.00	2.65
248...	48.00	3.55	20.00	2.05	6.90	1.50	.80	1.80	.....	36.60	56.65	20.05	11.00	1.82
249...	33.00	6.00	20.00	2.90	14.88	1.50	1.40	2.00	.....	48.68	87.78	39.10	16.50	2.37
250...	55.00	4.50	20.00	2.90	10.33	2.75	4.00	1.80	.....	46.28	74.90	28.62	14.00	2.04
251...	53.00	4.15	20.00	2.90	10.75	1.20	2.36	2.00	.....	43.36	60.50	17.14	11.00	1.56
252...	38.80	4.98	23.19	2.83	9.06	3.18	5.00	1.60	.20	50.04	123.26	73.22	21.40	3.42
253...	60.00	3.09	20.00	2.44	5.64	2.30	3.00	2.00	.....	38.47	80.35	41.88	14.40	2.91
254...	21.00	6.00	10.10	5.70	8.30	4.80	16.00	2.00	.....	52.90	74.90	22.00	14.00	1.57
COLORADO, SOUTHERN DISTRICT.														
255...	30.00	$5.03	$18.00	$3.40	$6.10	$5.71	$6.33	$2.20	.....	$46.77	$78.00	$31.23	12.00	$2.60
256...	23.00	6.32	13.76	3.40	10.55	2.25	2.78	2.30	.....	41.36	84.50	43.14	13.00	3.32
257...	60.00	2.50	12.50	2.40	9.01	.63	1.75	2.00	.....	30.79	65.34	34.55	12.10	2.86
258...	10.00	2.55	20.00	2.09	5.75	.75	.....	2.50	.....	33.64	63.18	29.54	9.00	3.28
259...	38.00	5.60	15.50	2.40	8.00	4.10	10.50	2.50	.....	48.60	62.50	13.90	10.00	1.39
260...	18.00	5.32	15.50	2.71	8.75	.99	15.00	4.00	.....	52.27	63.25	10.98	11.50	.95
261...	25.00	6.40	13.00	3.60	5.31	.40	5.10	2.00	.....	35.81	20.63	[1]15.18	3.75	[1]4.05
262...	40.00	5.00	21.00	3.75	4.25	1.50	.....	2.00	$0.50	38.00	18.00	[1]20.00	3.00	[1]6.67

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS—Continued.

COLORADO, SOUTHERN DISTRICT—Continued.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
263...	7.00	$2.76	$16.00	$3.53	$7.50	$1.70	$4.00	$2.00	.....	$37.49	$72.00	$34.51	12.00	$2.88
264...	163.00	4.55	17.00	1.27	8.25	2.25	3.00	2.50	$0.07	38.89	83.38	44.49	14.50	3.07
265...	12.00	4.84	15.00	2.20	8.91	1.30	.48	2.00	.....	34.73	42.00	7.27	7.00	1.04
266...	3.00	3.80	11.00	2.90	4.80	.90	.....	1.50	.....	24.90	14.30	[1] 10.60	2.60	[1] 4.08
267...	10.00	3.00	7.25	1.75	.....	.20	.....	1.70	.10	14.00	10.00	[1] 4.00	2.00	[1] 2.00
268...	21.56	6.44	17.75	4.97	12.60	3.82	12.55	2.10	.....	60.23	94.40	34.17	16.00	2.14
269...	4.50	2.50	14.00	2.10	12.00	3.50	9.00	2.00	.....	45.10	125.00	79.90	20.00	4.00
270...	15.00	3.30	14.00	2.10	9.50	1.50	.....	2.00	.....	32.40	93.75	61.35	15.00	4.09
271...	15.00	5.57	18.00	2.50	10.50	2.75	7.33	2.00	.....	48.65	100.00	51.35	16.00	3.21
272...	125.00	4.86	14.00	2.88	7.66	2.28	1.36	2.00	.....	35.04	60.00	24.96	10.00	2.50
273...	14.00	4.90	14.99	1.90	10.55	2.50	4.25	1.20	.25	40.54	95.58	55.04	15.10	3.65
274...	14.00	5.62	20.00	3.50	7.98	3.40	1.25	2.00	.....	43.75	60.38	16.63	10.50	1.58
275...	4.00	3.30	19.00	4.00	13.50	4.12	16.50	2.00	.....	62.42	116.55	54.13	21.00	2.58
276...	6.00	3.68	18.79	1.75	6.50	1.43	2.75	2.00	.....	36.90	65.00	28.10	10.00	2.81
277...	13.00	7.21	18.00	4.30	8.00	3.52	1.00	1.50	.20	43.73	69.00	25.27	12.00	2.11
278...	31.00	3.50	16.50	1.30	10.50	4.00	2.90	1.80	.....	40.50	74.75	34.25	13.00	2.63
279...	8.00	4.65	20.00	3.00	7.25	2.00	4.00	2.00	.50	43.40	87.00	43.60	15.00	2.91
280...	45.00	4.11	15.25	2.40	10.75	.39	.....	2.00	.....	34.90	69.30	34.40	11.00	3.13
281...	49.00	3.20	15.50	2.30	4.66	1.50	3.26	2.00	.....	32.42	82.15	49.73	13.25	3.75
282...	34.00	5.05	14.00	4.80	6.70	1.50	.....	2.00	.....	34.05	91.00	56.95	14.00	4.07
283...	13.00	5.13	14.15	3.35	7.40	3.50	5.25	1.70	.....	40.48	112.50	72.02	18.00	4.00
284...	16.00	4.05	14.25	1.80	8.75	2.75	2.20	2.00	.....	35.80	75.00	39.20	12.50	3.14
285...	10.00	5.90	16.00	2.80	4.25	3.00	17.00	2.00	.....	50.95	27.00	[1] 23.95	4.50	[1] 5.32
286...	3.25	9.80	16.75	5.00	11.00	3.00	5.00	2.00	.....	52.55	91.36	38.81	16.00	2.43
287...	21.00	10.27	16.00	3.13	10.00	1.48	6.86	2.00	.....	49.74	82.50	32.76	15.00	2.18
288...	53.00	3.96	14.50	3.40	10.29	3.62	13.20	1.70	.....	50.67	88.58	37.91	17.30	2.19
COLORADO, MONTE VISTA DISTRICT.														
289...	12.00	$3.00	$18.00	$1.65	$7.25	$0.75	$3.00	$2.25	$8.33	$44.23	$61.42	$17.19	10.50	$1.64
290...	10.00	3.75	18.00	2.00	7.25	.75	3.00	3.00	.....	37.75	38.15	.40	7.00	.06
291...	42.00	2.25	16.50	3.10	2.25	1.00	.....	2.77	.....	27.87	42.42	14.55	7.00	2.08
COLORADO, GRAND JUNCTION DISTRICT.														
292...	12.00	$4.64	$20.00	$3.25	$10.17	$5.80	.....	$2.70	.....	$46.56	$69.55	$22.99	13.00	$1.77
293...	14.33	4.64	20.00	2.75	10.77	5.80	$5.38	2.70	.....	52.04	76.68	24.64	14.33	1.72
294...	35.00	4.36	20.00	2.77	8.67	3.95	3.50	2.70	$3.13	49.08	60.00	10.92	12.00	.91
295...	40.00	3.79	20.00	2.50	7.97	2.00	1.25	2.40	.....	39.91	70.00	30.09	14.00	2.15
296...	18.00	7.64	21.50	3.36	9.87	4.20	4.33	2.70	.65	54.25	75.00	20.75	15.00	1.38
297...	7.00	4.63	20.00	3.48	18.39	2.83	6.17	2.25	.49	58.24	129.09	70.85	22.14	3.20
298...	14.00	6.87	21.50	3.10	10.12	2.90	11.96	2.40	.35	59.20	52.50	[1] 6.70	10.00	[1] .67
299...	16.00	6.00	20.00	3.90	4.33	3.39	4.53	2.25	.23	44.63	16.50	[1] 28.13	3.00	[1] 9.38
300...	20.00	7.30	20.00	4.80	5.62	4.75	1.09	2.85	.25	46.66	30.30	[1] 16.36	6.00	[1] 2.73
301...	65.00	8.01	20.00	7.72	12.75	6.10	1.57	2.63	.38	59.16	49.34	[1] 9.82	9.75	[1] 1.01

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

MONTANA.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
302...	22.00	$9.50	$20.00	$2.35	$13.75	$3.00	$2.00	$1.50	$0.10	$52.50	$74.75	$22.55	13.00	$1.73
303...	47.00	6.00	20.00	3.60	10.30	3.00	12.44	2.00	.....	57.34	87.60	30.26	14.60	2.07
304...	95.00	5.50	20.00	3.10	9.50	3.00	7.00	1.80	.....	49.90	76.70	26.80	13.00	2.06
305...	15.00	7.00	20.00	2.55	15.50	3.00	6.00	1.50	.....	55.55	72.87	17.32	12.50	1.39
306...	24.00	7.00	20.00	4.70	9.00	3.00	10.00	2.00	.....	55.70	52.80	[1] 2.90	9.60	[1].30
307...	32.00	7.00	20.00	4.70	15.85	4.50	10.00	2.00	.....	64.05	94.87	30.82	16.50	1.87
308...	26.00	4.00	20.00	1.90	14.62	2.00	.....	2.00	.....	44.52	93.00	48.48	15.50	3.13
309...	12.00	4.25	20.00	3.50	10.50	2.50	.....	2.00	.....	42.75	46.25	3.50	9.25	.38
310...	20.00	6.00	20.00	2.00	11.50	4.00	10.00	2.00	1.00	56.50	69.00	12.50	12.00	1.04
311...	25.00	5.00	20.00	2.30	10.50	2.50	.....	2.00	1.00	43.30	90.00	46.70	15.00	3.11
312...	39.50	4.00	20.00	2.25	12.25	1.60	.....	2.00	.....	42.10	80.16	38.06	13.36	2.85
313...	27.15	5.92	20.00	2.52	10.59	2.28	.90	1.50	.....	43.71	92.29	48.58	15.18	3.20
314...	12.00	8.00	20.50	4.78	6.88	4.00	.....	2.00	.....	46.16	31.85	[1] 14.31	5.18	[1] 2.76
315...	28.00	6.06	20.00	3.85	13.74	3.10	.84	2.00	1.00	50.59	57.05	6.46	9.04	.71
316...	3.25	5.19	20.00	3.00	8.63	4.40	1.25	1.50	.20	44.17	31.87	[1] 12.30	5.10	[1] 2.41
317...	25.00	4.50	25.00	3.40	21.00	2.33	.....	1.60	.10	57.93	106.25	48.32	17.00	2.84
318...	53.00	8.66	20.00	6.75	17.00	6.25	2.42	1.70	1.30	64.08	78.40	14.32	14.00	1.02
319...	56.00	3.50	20.00	2.10	11.25	2.50	5.00	2.00	.91	47.26	67.44	20.18	12.00	1.68
320...	30.00	5.00	20.00	3.33	17.66	3.80	6.66	2.00	1.00	59.45	86.95	27.50	14.42	1.91

IDAHO.

321...	35.00	$3.06	$30.00	$1.93	$6.80	$0.05	$5.47	$2.25	.....	$49.56	$60.00	$10.44	12.00	$0.87
322...	6.00	3.55	13.60	4.00	6.50	.77	3.70	2.25	.....	34.37	50.00	15.63	10.00	1.56
323...	23.00	6.80	25.00	1.92	6.75	1.35	12.83	2.40	.....	57.05	85.00	27.95	17.00	1.64
324...	60.00	5.75	31.83	2.40	6.85	2.18	6.00	2.25	$0.10	57.36	72.50	15.14	14.50	1.04
325...	40.00	4.08	17.25	2.30	10.00	.25	.....	2.55	.....	36.43	75.00	38.57	15.00	2.57
326...	110.00	5.10	36.71	2.17	7.96	.10	4.29	1.95	.....	58.28	78.00	19.72	15.60	1.26
327...	9.00	5.23	20.00	2.14	11.28	2.40	3.55	2.25	.....	46.85	58.50	11.65	11.70	1.00
328...	65.00	5.36	22.70	2.63	16.66	3.72	2.77	2.70	.....	56.54	82.50	25.96	16.50	1.57
329...	9.00	6.67	21.20	3.40	11.60	2.55	2.22	2.25	.....	49.89	70.00	20.11	14.00	1.44
330...	50.00	4.90	21.50	2.40	11.93	3.60	1.40	2.25	.....	47.98	72.50	24.52	14.50	1.69
331...	30.00	5.19	20.00	1.90	8.40	2.70	3.25	2.25	.....	43.69	60.00	16.31	12.00	1.36
332...	19.00	5.20	20.00	2.40	13.20	2.70	.....	2.25	.....	45.75	56.00	10.25	11.20	.92
333...	34.00	4.00	22.25	2.10	6.25	3.20	10.00	2.25	.....	50.05	75.00	24.95	15.00	1.66
334...	8.00	5.71	21.50	3.42	9.75	1.70	5.85	2.25	.....	50.18	77.55	27.37	15.51	1.76
335...	7.00	4.67	23.00	2.80	16.00	3.73	6.65	2.10	.16	59.11	90.00	30.89	18.00	1.72
336...	3.00	4.81	21.00	2.27	6.10	2.20	9.10	1.80	.40	47.68	71.55	23.87	14.31	1.67
337...	10.00	6.00	19.00	5.75	12.50	2.70	3.03	1.50	.20	50.68	49.65	[1] 1.03	9.93	[1].10
338...	80.00	3.62	19.50	2.22	6.22	1.78	2.76	2.25	.12	38.47	57.50	19.03	11.50	1.65
339...	30.00	3.15	18.50	1.49	5.90	3.56	.70	2.25	.67	36.22	42.75	6.53	9.00	.73
340...	6.50	6.52	20.50	3.61	12.24	2.85	.....	2.25	.....	47.97	61.75	13.78	13.00	1.06
341...	7.00	6.52	18.50	3.61	9.44	2.85	.....	2.25	.....	43.17	42.75	[1].42	9.00	[1].05

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

UTAH, NORTHERN DISTRICT.

Farm number.	Acres.	Cost per acre.									Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
													Tons.	
342...	15.00	$3.13	$13.74	$5.00	$6.60	$3.06	$14.00	$2.25	.....	$47.78	$95.33	$47.55	20.50	$2.32
343...	6.00	9.41	18.00	3.90	18.50	1.54	12.98	2.25	.....	66.58	100.00	33.42	20.00	1.67
344...	4.50	3.80	15.50	3.03	17.50	2.40	5.38	2.25	.....	49.86	100.00	50.14	20.00	2.51
345...	10.00	4.50	17.05	3.40	11.30	2.50	3.00	1.80	.....	43.55	88.35	44.80	19.00	2.36
346...	4.50	4.56	18.70	2.98	10.70	2.08	5.61	2.91	.....	47.54	83.70	36.16	18.00	2.01
347...	3.50	4.65	13.50	2.98	13.50	2.28	.....	1.80	.....	38.71	50.00	11.29	10.00	1.13
348...	3.00	6.11	12.00	3.10	6.53	8.75	6.00	2.25	.....	44.74	46.00	1.26	10.00	.13
349...	13.00	3.80	37.25	3.00	11.25	2.50	.....	2.25	.....	60.05	82.50	22.45	16.50	1.36
350...	11.00	2.55	14.00	2.50	11.33	1.50	.....	2.25	.....	34.13	90.00	55.87	18.00	3.10
351...	5.00	3.35	20.10	3.00	11.95	4.85	9.63	2.25	$0.10	55.23	99.75	44.52	21.00	2.12
352...	7.00	4.60	29.38	2.50	9.95	2.00	11.30	2.25	.....	61.98	125.88	63.90	26.50	2.41
353...	9.00	4.05	25.81	2.50	22.78	2.50	4.44	2.25	.....	64.33	98.75	34.42	19.75	1.74
354...	27.00	5.31	35.56	1.95	11.62	3.00	2.96	2.25	.....	62.65	101.50	38.85	20.30	1.91
355...	50.00	2.98	20.00	2.05	5.00	2.80	2.62	2.25	.....	37.70	70.00	32.30	14.00	2.31
356...	60.00	4.25	24.34	1.90	9.16	4.60	3.25	2.25	.....	49.75	77.00	27.25	15.40	1.77
357...	10.00	3.75	13.93	2.10	9.60	2.80	4.00	1.95	.....	38.13	58.18	20.05	12.25	1.64
358...	32.00	3.65	19.62	2.30	7.88	.50	2.00	1.80	.....	37.75	66.50	28.75	14.00	2.05
359...	100.00	4.00	18.50	1.32	13.90	2.50	2.50	2.25	.....	44.97	80.75	35.78	17.00	2.10
360...	12.00	3.10	14.00	2.40	15.05	.75	2.25	1.25	.....	38.80	90.25	51.45	19.00	2.71
361...	35.00	2.15	22.40	1.88	10.55	.50	3.50	2.25	.....	43.23	76.00	32.77	16.00	2.05
362...	4.00	2.80	18.80	2.00	13.05	1.20	4.50	2.25	.....	44.60	81.00	36.40	18.00	2.02
363...	10.00	2.50	9.20	1.20	8.65	.....	4.50	1.65	.....	27.70	76.00	48.30	16.00	3.02
364...	150.00	2.34	18.00	2.30	2.40	.....	.40	1.95	.....	27.39	76.00	48.61	16.00	3.04
365...	10.00	3.53	30.03	3.38	11.25	.59	14.80	1.80	.....	65.38	83.12	17.74	17.50	1.01
366...	14.00	3.85	14.89	1.85	5.17	.33	.40	2.25	.....	28.74	74.99	46.25	15.79	2.93
367...	15.00	4.38	15.50	1.55	9.38	1.40	6.67	2.25	.....	41.13	71.25	30.12	15.00	2.01
368...	21.00	3.38	31.46	1.25	10.50	.28	.....	2.10	.....	48.97	80.75	31.78	17.00	1.87
369...	9.00	4.50	21.00	2.39	16.50	2.31	9.00	1.80	.....	57.50	85.50	28.00	18.00	1.56
UTAH, CENTRAL DISTRICT.														
370...	5.00	$9.20	$21.06	$2.50	$10.90	$2.80	$9.30	$2.25	.....	$58.01	$79.00	$20.99	15.80	$1.33
371...	23.00	3.89	18.80	2.62	9.34	1.85	9.67	2.25	.....	48.42	70.00	21.58	14.00	1.54
372...	8.00	8.20	16.90	4.50	11.80	2.00	16.68	2.25	.....	62.33	65.00	2.67	13.00	.21
373...	25.00	7.84	14.45	7.20	9.40	5.50	12.00	2.25	.....	58.64	70.00	11.36	14.00	.81
374...	15.00	3.60	12.60	2.70	14.20	1.60	6.50	2.25	.....	43.45	85.00	41.55	17.00	2.44
375...	6.50	5.75	19.55	3.00	12.60	3.55	17.50	2.25	.....	64.20	70.00	5.80	14.00	.41
376...	12.00	4.15	13.25	2.00	7.50	2.50	24.00	2.25	.....	55.65	75.00	19.35	15.00	1.29
377...	6.50	6.00	11.22	1.70	10.15	2.10	4.00	2.25	.....	37.42	71.50	34.08	14.30	2.38
378...	5.00	4.08	15.80	3.00	7.50	1.95	4.00	2.25	.....	38.58	75.00	36.42	15.00	2.43
379...	10.00	5.53	15.00	3.70	13.75	1.52	7.50	2.25	.....	49.25	75.00	25.75	15.00	1.72
380...	14.00	5.28	15.00	3.00	14.25	1.75	7.19	2.25	.....	48.72	100.00	51.28	20.00	2.56
381...	60.00	3.40	11.00	1.75	7.13	1.35	.62	2.25	.....	27.50	40.00	12.50	8.00	1.56
382...	7.00	4.50	15.00	2.90	14.75	3.50	.....	2.25	.....	42.90	90.00	47.10	18.00	2.62

[1] Loss.

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

UTAH, CENTRAL DISTRICT—Continued.

Farm number.	Acres.	Cost per acre.								Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.			Tons.	
383...	5.00	$4.83	$15.00	$3.50	$12.50	$2.48	$8.00	$2.25	.....	$48.56	$100.00	$51.44	20.00	$2.57
384...	14.00	5.70	18.20	2.90	11.69	1.15	5.57	2.25	.....	47.46	74.50	27.04	14.90	1.81
385...	13.00	5.63	18.80	1.95	11.25	6.80	8.80	2.25	.....	55.48	90.00	34.52	18.00	1.92
386...	8.00	4.85	13.13	3.20	12.69	2.75	5.40	2.25	.....	44.27	61.25	16.98	12.25	1.39
387...	5.00	5.43	14.40	3.93	14.27	6.65	24.80	2.25	.....	71.73	105.00	33.27	21.00	1.58
388...	4.00	4.60	21.36	4.50	12.60	2.75	2.25	2.25	.....	50.31	80.00	29.69	16.00	1.86
389...	9.00	6.25	20.05	4.25	9.35	5.65	7.13	2.25	$0.10	55.03	85.00	29.97	17.00	1.76
390...	2.00	4.50	16.00	2.00	6.00	.....	.....	2.25	.....	30.75	80.00	49.25	16.00	3.08
391...	5.00	6.40	18.20	4.30	11.04	10.00	.....	2.25	.10	52.29	92.00	39.71	18.40	2.16
ARIZONA.														
392...	10.00	$5.69	$17.00	$3.93	$10.12	$3.15	.....	$2.25	$0.05	$42.19	$50.00	$7.81	10.00	$0.78
CALIFORNIA, ALVARADO DISTRICT.														
393...	18.00	$4.28	$16.20	$1.10	$6.21	$6.25	$0.25	$1.30	.....	$35.59	$60.00	$24.41	12.00	$2.03
394...	12.00	4.00	14.50	.80	5.26	.....	.....	2.00	.....	26.56	40.00	13.44	8.00	1.68
CALIFORNIA, SPRECKELS DISTRICT.														
395...	210.00	$5.46	$14.70	$0.38	$5.57	.....	.....	$1.32	.....	$27.43	$86.24	$58.81	14.00	$4.20
396...	97.00	7.82	11.10	.98	7.36	$3.75	.....	2.20	.....	33.21	49.95	16.74	11.10	1.51
397...	110.00	6.21	12.00	1.00	7.60	4.19	.....	1.87	.....	32.87	54.00	21.13	12.00	1.76
398...	40.00	9.78	22.43	.70	13.75	2.20	.....	1.76	.....	50.62	122.85	72.23	19.50	3.70
399...	165.00	8.11	17.24	1.18	11.00	3.10	.....	2.26	.....	42.89	90.30	47.41	14.00	3.39
400...	96.00	4.63	21.09	1.00	7.41	3.75	.....	1.43	.....	39.31	90.38	51.07	20.08	2.54
401...	10.00	5.77	12.83	.98	5.10	.....	.....	.83	.....	25.51	47.50	21.99	9.50	2.31
402...	55.00	6.07	7.50	2.00	5.34	.....	.....	1.32	.....	22.23	39.48	17.25	6.00	2.88
CALIFORNIA, BETTERAVIA DISTRICT.														
403...	24.00	$3.94	$25.30	$1.36	$14.00	$5.00	.....	$2.16	.....	$51.76	$112.20	$60.44	22.00	$2.75
404...	170.00	5.45	18.00	1.96	4.05	8.00	.....	2.50	.....	39.96	46.80	6.84	9.00	.76
405...	95.00	4.78	20.06	1.19	9.64	5.10	.....	2.40	.....	43.17	75.23	32.06	14.75	2.17
CALIFORNIA, OXNARD DISTRICT.														
406...	124.00	$4.54	$14.94	$1.44	$7.85	.....	.....	$2.75	.....	$31.52	$76.22	$44.70	10.30	$4.34
407...	40.00	3.73	17.92	1.76	9.65	.....	$0.75	2.50	.....	36.31	75.53	39.22	13.00	3.02
408...	95.00	4.53	16.31	1.39	6.92	$7.58	.....	2.25	$0.53	39.51	65.45	25.94	10.80	2.40
409...	63.00	7.96	15.08	3.20	7.64	.....	5.60	2.40	.....	41.88	71.40	29.52	10.10	2.92
410...	40.00	4.84	16.15	1.53	8.68	.90	.25	1.92	.....	34.27	74.90	40.63	14.00	2.90
411...	450.00	4.89	17.25	1.70	3.75	.....	.....	2.20	.....	29.79	90.00	60.21	15.00	4.01
412...	1,857.00	10.15	17.00	1.93	6.06	.....	.....	2.50	.....	37.64	78.00	40.36	11.42	3.53

TABLE 11.—COSTS AND PROFITS OF GROWING BEETS IN THE UNITED STATES, BY FARMS GROUPED BY DISTRICTS, 1913—Continued.

CALIFORNIA, LOS ANGELES DISTRICT.

Farm number.	Acres.	Cost per acre.								Value per acre.	Profit per acre.	Yield per acre.	Profit per ton.
		Preparation of soil.	Hand labor.	Planting and cultivating.	Lifting and hauling.	Irrigation.	Fertilizer.	Seed.	Miscellaneous.	Total expenses.				
												Tons.	
413...	85.00	$8.04	$19.63	$2.50	$8.32	$1.23	.....	$2.16	.....	$41.88	$69.75	$27.87	15.50	$1.80
414...	15.00	7.34	18.25	2.80	13.75	1.33	$3.96	2.40	.....	49.83	131.15	81.32	21.50	3.78
415...	6.00	4.54	12.20	2.00	9.70	3.00	8.00	1.92	.....	41.36	72.00	30.64	12.00	2.55
416...	38.00	8.49	18.75	3.50	11.50	.....	.....	2.16	$0.10	44.50	101.15	56.65	17.00	3.33
417...	25.00	7.60	14.65	2.95	11.00	.....	.....	2.40	.....	38.60	78.00	39.40	13.00	3.03
418...	50.00	8.20	16.70	2.38	13.20	7.32	.....	2.40	.....	50.20	107.64	57.44	18.40	3.12
419...	28.00	8.75	13.70	1.52	5.45	3.50	.....	2.40	.....	35.32	40.00	4.68	8.00	.59
420...	250.00	5.84	9.36	2.29	4.84	8.00	.....	6.00	.....	36.33	30.80	[1] 5.53	4.40	[1] 1.26
421...	85.00	8.71	14.95	2.50	9.85	2.49	5.88	2.40	.....	46.78	73.01	26.23	14.90	1.76
422...	8.00	4.60	13.00	1.54	5.00	.74	.....	1.50	.....	26.38	62.50	36.12	10.00	3.61
423...	52.00	5.85	14.35	3.00	5.99	1.18	.....	2.40	.....	32.77	81.00	48.23	13.50	3.57
424...	65.00	7.75	13.00	2.50	7.80	2.00	.....	2.40	.....	35.45	65.00	29.55	10.00	2.96
425...	137.00	4.78	11.25	3.15	6.25	4.28	.....	2.40	.....	32.11	40.25	8.14	7.00	1.16
426...	19.00	6.71	14.21	3.20	9.55	3.77	.....	2.40	.....	39.84	73.36	33.52	13.10	2.56
427...	35.00	7.60	18.25	2.80	9.55	.....	.....	2.50	.....	40.70	159.80	119.10	23.50	5.07
428...	55.00	5.40	10.80	3.00	7.00	2.00	.....	1.80	.....	30.00	52.00	22.00	8.00	2.75
429...	160.00	10.37	15.80	2.33	8.10	1.50	6.75	2.25	.....	47.10	98.40	51.30	16.00	3.21
430...	60.00	4.28	13.00	2.25	9.00	2.00	.....	1.68	.....	32.21	61.33	29.12	12.00	2.43
431...	130.00	4.41	13.50	1.32	10.04	.30	.....	2.40	.....	31.97	76.05	44.08	13.00	3.39
432...	10.00	06	11.30	2.10	5.80	.....	9.20	2.40	.....	35.86	49.35	13.49	7.00	1.93
433...	115.00	6.50	12.27	1.74	8.72	2.08	.....	2.64	.....	33.95	69.60	35.65	9.60	3.71
434...	75.00	9.16	11.52	2.53	4.11	2.72	2.39	2.40	.....	34.83	39.20	4.37	6.70	.65
435...	370.00	5.50	12.23	2.50	6.20	10.50	.....	2.40	.....	39.33	42.00	2.67	8.00	.33
436...	250.00	10.60	13.74	4.50	9.24	2.44	.....	2.16	.....	42.68	57.60	14.92	9.60	1.55
437...	10.00	8.25	23.60	2.68	13.40	1.42	.....	2.40	.....	51.75	159.90	108.15	26.00	4.16
438...	200.00	8.59	17.25	3.30	13.25	2.14	.....	2.16	.....	46.69	82.50	35.81	15.00	2.39
439...	135.00	5.51	17.95	2.00	11.90	7.00	5.55	2.40	.....	52.31	99.75	47.44	19.00	2.50
440...	44.00	5.80	15.50	2.80	4.75	4.40	1.00	2.40	.....	36.65	90.95	54.30	17.00	3.19
441...	185.00	9.20	16.30	2.60	9.95	6.00	.73	2.40	.....	47.18	93.60	46.42	16.00	2.90
442...	110.00	4.73	13.50	2.70	5.40	4.00	.30	2.40	.....	33.03	63.00	29.97	12.00	2.50
443...	136.00	4.57	16.96	1.00	3.72	2.33	.....	2.40	.....	30.98	100.62	69.64	17.20	4.05
444...	110.00	6.04	15.30	2.39	7.44	2.43	.....	2.40	.....	36.00	48.00	12.00	12.00	1.00
445...	20.00	9.76	15.95	2.50	7.65	.....	.....	2.40	.....	38.26	89.05	50.79	13.00	3.91
446...	40.00	4.16	10.85	2.50	5.15	4.84	.....	2.40	.....	29.90	35.00	5.10	5.00	1.02
447...	35.00	6.40	16.85	3.60	10.00	.34	.....	2.40	.....	39.59	89.60	50.01	16.00	3.13
448...	20.00	5.12	16.85	2.50	11.50	.50	.....	2.40	.....	38.87	113.90	75.03	17.00	4.41
449...	49.00	5.95	16.35	2.25	11.50	3.96	.....	2.40	.....	42.41	105.40	62.99	17.00	3.71
450...	253.00	5.85	14.25	2.37	15.50	6.58	.....	2.16	.....	46.71	81.00	34.29	13.50	2.54
451...	310.00	10.42	14.25	3.28	7.45	1.10	.21	2.16	.....	38.87	54.00	15.13	9.00	1.68
452...	17.00	5.50	15.42	2.05	8.23	2.00	.....	1.92	.....	35.12	86.72	51.60	14.10	3.66
453...	33.00	5.83	16.00	1.60	10.50	2.50	.....	2.30	.....	38.73	82.50	43.77	15.00	2.92

[1] Loss.

The wide differences in some of the elements of cost as shown in the foregoing table are due to various causes. The more important of the differences shown for different farms are due to differences in the character of soils, the condition of the land before it was prepared for the crop, the cost of labor and distances of the fields from the factories, the cost of seed and fertilizer, climatic conditions, and, in the West, differences in the cost of irrigation. A cause of minor importance, because it applies only to a relatively few comparisons, is the fact that in some cases the various elements could not be segregated. Thus the column showing the cost of planting and cultivating in a few instances has only the cost of planting, the farmer not being able to separate the cost of cultivating from other operations requiring the use of teams and implements.

The variation in the cost of seed is due to a difference in price, which is sometimes as much as 5 cents a pound, and also to a difference in the quantity used by the different planters, the prescribed quantity ranging from about 15 to 20 pounds per acre.

There is a wide variation in the cost of fertilizer materials. In some districts none is used, in others only a barnyard manure is used, and in still others there is some use of commercial fertilizers. Usually no cost has been allowed for barnyard manure except that for hauling and spreading. This is because generally there was no market value for such manure.

There is considerable variation in the cost of the preparation of the soil, due to its character or condition. Variations in cost of cultivation (excluding hoeing) are due to differences in condition of the soil, to seasons, and to the cost of labor. On some farms, under exceptionally favorable conditions, the cultivator is used only once or twice during the season, while in other cases, on account of excessive rains or for other reasons, the crop is cultivated seven or eight and in a few instances more times. The cost of a single cultivation ranges from 30 to 50 cents per acre. The wages of a man and team varies from about $2.50 to $5 per day, depending upon the rate of pay for the man and also upon the number of horses employed.

The hand labor when done by contract is practically uniform in a particular district. This charge ranged in various districts from $16 or $17 to $22 per acre.

The cost of plowing out the beets differs on account of the character of the soil and the cost of labor, but in a general way it is determined by the rate allowed for a man and team.

In soils that are easily worked a greater area can be covered in a day, both in the preparation of the soil, in the cultivation and in plowing out, thereby lessening the cost per acre. In some sections, particularly in the Lake States and Montana and northern Colorado

where the fall rains and snow set in before the beets are harvested, the cost of plowing out is increased.

There are great differences in the cost of irrigation. No irrigation is required in the region of the Great Lakes, but in all the western districts beets can not usually be grown successfully without irrigation. When subirrigation can be employed the cost is lower, but when water must be run between the rows, the cost amounts usually to from $3 to $5 per acre for the water and the labor of putting it on the land. There is also an expense for maintenance of main and lateral ditches. Furthermore, in some districts, water is put on the land only once or twice during a season, while in other districts it is applied as many as five or six times.

The cost of "lifting and hauling" varies according to the production, and also according to the distance of the fields from the factory or weigh station. The cost of lifting or plowing out is substantially the same whether the production is 5 tons or 15 tons per acre. It is obvious, however, that the greater the yield the greater must be the expense of hauling, and also that the expense of hauling increases with the distance to be hauled.

It is thus seen that there is a reasonable explanation for practically all differences appearing in the table. These explanations are obvious to the practical farmer familiar with the cultivation of beets.

Section 9. Average costs and profits of individual growers for three years.

The actual results from the cultivation of beets in any locality can be determined only by securing accurate data from every farmer growing beets in the community. This is obviously impracticable, if not impossible. In the course of this investigation an effort was made to secure from each farmer visited data for three consecutive years. This was not possible. Many of the farmers visited did not have sufficient data from which to construct a reasonably accurate statement for 3 years, and in some sections factories had operated only 2 years. Some had not grown beets in the same locality for 3 years. Of the 453 farms represented in Table 11 there were 244 for which complete 3-year statements could be made.

The distribution of these 244 farms among the States visited and the percentage of the total shown in Table 11 are given in the statement below by States:

	Number reporting for 1913.	Number reporting for 3 years.	Per cent of total for 3 years.
Ohio and Indiana	30	15	50.0
Michigan, lower peninsula	97	18	18.6
Wisconsin	27	23	85.2
Minnesota	11	8	72.5
Iowa	9	5	55.6
Nebraska	14	9	64.3
Kansas	5	4	80.0
Colorado	108	66	61.1
Montana	19	4	21.1
Idaho	21	10	47.6
Utah	50	41	80.2
California	61	41	67.5
Total	[1] 452	244	53.9

[1] One farm in Arizona shown in Table 11 is not included here.

It is seen that more than half of the farms represented in Table 11 furnished reports for 3 years. It will be noted, however, that cost statements were secured from comparatively few farmers in some of the States. Those States for which the smallest number of 3-year statements were secured, namely, Iowa, Kansas, and Montana, have only one factory each, so the data for those States are as representative as for others. It is particularly noticeable that a very small percentage of the farmers visited in Michigan could supply data for 3 years. On the other hand, taking into account the number of farmers visited in Colorado, California, and Utah, the high percentage of those who were able to supply costs for 3 years is rather remarkable.

The total costs and profits per acre by districts and by States are shown in Table 12 below. This table includes all those farms represented in Table 12 already discussed, for which were secured complete statements for 3 years. The true averages of expense and profit are shown.

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913.

OHIO—INDIANA.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year averages	6	31.07	9.03	$37.08	$4.11	$8.08	$0.89
	4	48.33	12.38	38.93	3.14	23.65	1.91
	15	12.67	14.58	31.59	2.17	44.04	3.02
	18	7.28	10.13	37.12	3.66	13.53	1.34
	19	13.17	12.42	38.39	3.09	23.73	1.91
	20	11.33	12.06	39.04	3.24	21.26	1.76
	21	5.25	9.00	32.83	3.65	16.67	1.85
	23	15.67	13.13	35.88	2.73	29.75	2.27
	24	12.00	8.44	34.63	4.10	10.12	1.20
	25	8.67	14.62	37.72	2.58	35.96	2.46
	26	9.67	12.22	41.00	3.35	25.81	2.11
	27	15.00	13.22	38.67	2.92	27.44	2.08
	28	15.67	11.89	38.45	3.23	33.86	2.85
	29.	6.00	14.76	41.93	2.84	33.60	2.28
	30	10.08	11.91	40.22	3.38	24.84	2.09
Average (15 farms)	.....	14.79	11.85	37.70	3.18	23.59	1.99

MICHIGAN, LOWER PENINSULA.

3-year averages	47	15.57	9.38	$44.86	$4.78	$4.68	$0.50
	50	43.74	9.77	42.16	4.31	5.51	.56
	108	1.83	9.58	47.20	4.93	12.87	1.34
	109	2.25	6.67	40.57	6.08	1.27	.19
	110	2.33	9.01	43.41	5.38	10.90	1.21
	65	25.25	11.15	38.77	3.48	24.96	2.24
	69	23.50	7.18	33.96	4.73	4.84	.67
	36	20.53	8.55	40.93	4.79	3.89	.46
	37	12.17	11.64	41.15	3.54	23.19	1.99
	38	5.20	11.41	42.92	3.76	22.34	1.96
	39	7.17	12.38	47.80	3.86	20.24	1.63
	41	16.67	14.28	38.29	2.68	37.12	2.60
	42	7.50	11.33	37.38	3.30	21.43	1.89
	55	9.97	9.23	39.05	4.23	10.82	1.17
	57	20.49	10.79	38.65	3.58	17.72	1.64
	73	28.33	13 34	37.65	2.82	31.02	2.33
	102	38.00	13.01	41.00	3.15	25.66	1.97
	103	41.67	11.19	43.34	4.32	21.55	1.93
Average (18 farms)	.....	17.90	10.92	41.15	3.77	17.80	1.63

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

WISCONSIN, NORTHERN DISTRICT.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year averages	129	1.83	13.82	$47.08	$3.41	$35.83	$2.59
	131	1.58	10.58	37.54	3.55	25.93	2.45
	132	2.00	10.17	53.40	5.25	7.60	.75
	133	5.33	20.05	54.20	2.70	66.12	3.30
	135	1.67	12.63	41.73	3.30	34.07	2.70
	136	2.00	10.08	44.58	4.42	15.92	1.58
	137	11.83	11.00	40.50	3.68	25.50	2.32
	138	4.50	10.44	46.59	4.47	16.02	1.53
	139	13.17	12.20	40.86	3.35	32.35	2.65
	140	4.67	9.43	40.47	4.29	16.10	1.71
	141	3.00	11.00	30.76	2.80	30.74	2.79
	142	24.00	8.47	40.00	4.72	2.36	.28
	143	18.83	11.46	38.43	3.35	20.59	1.80
	144	68.33	13.23	38.14	2.88	29.95	2.26
	145	17.00	10.41	38.19	3.67	15.43	1.48
Average (15 farms)	.....	11.98	11.83	39.77	3.36	23.83	2.02

WISCONSIN, SOUTHERN DISTRICT.

3-year averages	152	3.67	12.82	$48.54	$3.79	$32.05	$2.50
	153	15.00	15.56	40.42	2.60	40.67	2.61
	154	8.67	13.92	43.67	3.14	26.44	1.90
	147	2.17	14.54	47.40	3.26	36.30	2.50
	148	2.92	16.20	40.75	2.52	52.59	3.25
	149	7.33	14.00	46.25	3.30	35.90	2.56
	150	14.67	12.00	40.50	3.38	21.55	1.80
	151	3.00	18.00	45.20	2.51	55.22	3.07
Average (8 farms)	.....	7.18	14.15	42.72	3.02	33.68	2.38

MINNESOTA.

4-year averages	155	1.08	10.15	$41.23	$4.06	$14.62	$1.44
	156	3.83	15.83	44.78	2.83	42.26	2.67
	157	3.33	9.70	45.20	4.66	8.15	.84
	160	15.67	14.27	37.16	2.60	34.20	2.40
	162	12.50	12.65	45.20	3.57	18.07	1.43
	163	7.67	10.37	40.94	3.95	10.91	1.05
	164	14.33	12.19	38.36	3.15	22.57	1.85
	165	4.33	11.08	41.63	3.76	13.76	1.24
Average (8 farms)	.....	7.84	12.56	40.77	3.25	22.84	1.82

IOWA.

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year average	166	29.00	13.98	$34.29	$2.45	$35.62	$2.55
	167	125.67	13.39	36.44	2.72	30.51	2.28
	169	11.00	13.67	39.40	2.88	34.40	2.52
	172	16.17	10 91	32.93	3.02	21.61	1.98
	173	61.67	7.89	31.01	3.93	8.45	1.07
Average (5 farms)	.....	48.70	11.92	34.71	2.91	25.12	2.11
NEBRASKA, GRAND ISLAND DISTRICT.							
3-year average	177	8.00	18.00	$37.15	$2.06	$52.85	$2.94
	178	4.33	8.85	24.35	2.75	19.88	2.25
	179	10.00	8.93	35.66	3.99	9.01	1.01
	181	6.67	8.50	36.26	4.27	6.24	.73
	182	3.83	9.13	28.33	3.10	17.32	1.90
	184	18.33	10.18	32.12	3.15	18.79	1.85
	185	11.67	13.00	33.05	2.54	31.98	2.46
	187	15.00	14.00	41.08	2.93	28.92	2.07
	188	12.33	16.66	30.47	1.83	52.84	3.17
Average (9 farms)	.....	10.02	12.39	34.12	2.75	27.84	2.25
KANSAS.							
3-year average	189	37.17	7.06	$32.34	$4.58	$4.54	$0.64
	190	48.33	8.05	34.05	4.23	6.75	.84
	191	41.00	5.10	21.38	4.19	4.21	.83
	192	39.00	9.83	32.65	3.32	17.65	1.80
Average (4 farms)	.....	41.38	7.52	30.20	4.02	8.20	1.09
COLORADO, NORTHERN DISTRICT.							
3-year average	212	36.67	10.77	$41.59	$3.86	$17.87	$1.66
	213	65.00	12.00	39.00	3.25	21 00	1.75
	214	62.17	14.37	39.63	2.76	32.24	2.24
	215	40.00	12.00	43.53	3.64	21.27	1.77
	216	39.00	11.36	44.79	3.94	14.30	1.26
	217	61.67	12.88	46.84	3.64	20.35	1.58
	218	36.45	17.18	53.92	3.14	35.97	2.09
	219	9.67	18.19	40.45	2.22	58.82	3.23
	220	50.00	14.00	46.37	3.31	31.13	2.22
	221	37.00	12.53	42.09	3.36	26.83	2.14
	225	90.67	14.57	44.63	3.06	32.31	2.22
	226	39.00	12.56	45.07	3.59	26.06	2.08
	227	20.00	11.50	41.76	3.63	22.45	1.95
	228	35.33	13.29	49.33	3.71	22.82	1.72
	231	11.00	15.00	48.65	3.24	26.35	1.76
	232	46.30	15.44	43.77	2.83	39.19	2.54
	233	45.67	10.14	44.27	4.37	11.79	1.16
	234	44.00	13.52	47.01	3.48	22.86	1.69

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

COLORADO, NORTHERN DISTRICT—Continued.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year average (continued)	237	31.00	14.28	$44.38	$3.11	$37.04	$2.59
	238	37.50	18.43	46.96	2.55	60.40	3.28
	239	13.67	17.27	37.15	2.15	63.29	3.66
	240	31.33	15.55	42.70	2.75	44.69	2.87
	243	50.00	17.00	50.42	2.97	42.53	2.50
	244	21.67	10.46	40.98	3.92	18.97	1.81
	246	52.00	16.13	42.46	2.63	42.78	2.65
	247	14.33	15.41	41.66	2.70	39.23	2.55
	249	54.33	17.30	48.72	2.82	47.51	2.75
	250	41.67	14.08	48.20	3.42	29.28	2.08
	254	25.67	16.23	53.54	3.30	34.23	2.11
	194	26.33	18.14	46.90	2.59	49.42	2.72
	195	54.33	17.55	49.88	2.84	59.57	3.39
	197	26.67	15.75	50.53	3.21	38.00	2.41
	199	48.33	16.41	60.12	3.66	28.85	1.76
	202	19.67	14.17	43.45	3.07	37.77	2.67
	204	30.00	15.67	60.04	3.83	27.62	1.76
	205	42.00	19.67	43.89	2.23	69.24	3.52
	207	22.50	22.70	56.76	2.50	67.03	2.95
	209	20.00	13.33	49.58	3.72	27.75	2.08
	211	17.67	16.11	43.95	2.73	48.86	3.03
Average (39 farms)		37.19	14.77	46.29	3.13	34.48	2.33

COLORADO, SOUTHERN DISTRICT.

3-year average	268	13.35	13.72	$57.57	$4.20	$29.08	$2.12
	271	15.00	16.00	48.65	3.04	51.35	3.21
	272	93.67	12.82	37.29	2.91	46.65	3.64
	273	9.67	17.43	44.80	2.57	63.58	3.65
	274	14.00	11.17	44.11	3.95	19.18	1.72
	275	4.67	20.82	62.62	3.01	52.94	2.54
	276	6.00	13.00	40.05	3.08	32.79	2.52
	277	13.33	11.20	40.97	3.66	20.05	1.79
	278	20.33	11.49	39.07	3.40	27.00	2.35
	279	8.00	12.67	40.95	3.23	29.45	2.33
	281	33.67	12.86	33.55	2.61	45.78	3.56
	282	41.33	11.10	33.76	3.04	31.11	2.80
	283	13.00	17.33	40.28	2.32	65.22	3.76
	284	19.00	13.23	35.82	2.71	43.55	3.29
	287	21.00	16.33	46.67	2.86	43.16	2.64
	288	70.00	15.34	39.79	2.59	49.31	3.21
	255	23.33	11.49	43.61	3.80	27.19	2.37
	257	36.00	11.25	30.18	2.68	32.68	2.90
	259	40.33	9.69	50.02	5.16	8.14	.84
	260	15.33	10.96	50.23	4.58	6.51	.59
	264	116.00	13.80	38.96	2.82	38.62	2.80
Average (21 farms)		29.86	13.12	40.11	3.06	37.46	2.86

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

COLORADO, GRAND JUNCTION DISTRICT.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year average	292	18.67	15.36	$51.08	$3.33	$31.08	$2.02
	294	48.33	15.10	47.45	3.14	34.24	2.27
	295	58.33	16.51	41.70	2.53	44.87	2.72
	296	20.00	13.63	53.36	3.91	15.90	1.17
	298	13.33	14.15	62.34	4.41	11.95	.84
	301	46.67	13.67	64.02	4.68	5.21	.38
Average (6 farms)	.....	34.22	14.99	51.45	3.43	27.14	1.81
MONTANA.							
3-year average	311	30.00	14.40	$43.92	$3.05	$46.61	$3.24
	312	35.00	13.60	42.18	3.10	40.01	2.94
	313	26.44	13.11	42.58	3.25	38.36	2.93
	314	14.83	7.82	47.84	6.12	1.11	.14
Average (4 farms)	.....	26.57	12.90	43.56	3.38	36.03	2.79
IDAHO.							
3-year average	334	5.33	13.85	$48.60	$3.51	$20.63	$1.49
	335	7.67	16.96	56.10	3.31	28.68	1.69
	337	10.67	10.78	50.01	4.64	3.89	.36
	322	9.33	12.64	36.26	2.87	26.95	2.13
	323	21.67	17.78	53.58	3.01	35.30	1.99
	324	60.00	15.17	58.67	3.87	17.16	1.13
	326	93.33	16.24	60.15	3.70	21.04	1.30
	329	6.67	13.25	49.37	3.73	16.88	1.27
	330	58.33	14.43	48.10	3.33	24.04	1.67
	333	30.67	15.32	50.37	3.29	26.21	1.71
Average (10 farms)	.....	30.37	15.30	54.45	3.56	22.06	1.44
UTAH, NORTHERN DISTRICT.							
3-year average	342	15.00	20.17	$47.69	$2.36	$46.09	$2.29
	343	4.33	20.00	66.60	3.33	30.70	1.54
	344	4.17	20.00	49.86	2.49	43.74	2.19
	345	25.00	19.87	41.77	2.10	50.61	2.55
	346	4.50	19.33	50.39	2.61	39.51	2.04
	347	3.50	13.33	43.38	3.25	23.29	1.75
	349	15.33	16.62	63.64	3.83	19.46	1.17
	350	12.67	16.97	33.46	1.97	51.41	3.03
	351	4.00	19.25	53.22	2.76	37.05	1.92
	352	6.33	23.34	58.66	2.51	50.64	2.17
	353	10.33	18.44	61.44	3.33	30.78	1.67
	354	27.67	18.31	57.91	3.16	33.66	1.84
	355	41.67	11.70	37.12	3.17	21.38	1.83

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

UTAH, NORTHERN DISTRICT—Continued.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year average (continued)	356	50.00	15.61	$50.92	$3.26	$27.13	$1.74
	358	22.33	14.37	38.04	2.65	29.51	2.05
	359	86.67	17.00	44.97	2.65	34.47	2.03
	360	12.00	17.67	37.03	2.10	45.38	2.57
	361	35.00	16.00	43.30	2.71	31.37	1.96
	362	4.00	16.00	42.20	2.64	29.80	1.86
	363	10.00	17.33	28.57	1.65	52.18	3.01
	364	125.00	16.96	27.47	1.62	51.98	3.06
	365	10.00	16.67	56.98	3.42	20.94	1.26
	366	12.00	16.53	29.26	1.77	48.03	2.91
	367	18.33	14.09	39.85	2.83	25.60	1.82
	368	20.33	19.05	53.27	2.80	35.66	1.87
	369	7.00	18.00	57.56	3.20	26.65	1.48
Average (26 farms)		22.58	16.73	42.04	2.51	37.54	2.24
UTAH, CENTRAL DISTRICT.							
3-year average	371	23.00	13.50	$47.82	$3.54	$19.68	$1.46
	372	12.67	9.45	58.42	6.18	[1] 12.86	[1] 1.36
	373	23.00	15.91	60.01	3.77	16.84	1.06
	374	13.00	17.15	43.54	2.54	39.57	2.31
	375	6.50	14.33	64.73	4.52	4.52	.32
	376	12.00	13.00	56.65	4.36	6.35	.49
	377	6.50	12.87	36.13	2.81	26.18	2.03
	378	5.00	15.00	38.58	2.57	36.42	2.43
	379	10.00	18.00	53.00	2.94	37.00	2.06
	380	15.67	20.00	48.72	2.44	51.28	2.56
	383	8.33	20.00	45.36	2.27	54.64	2.73
	384	12.67	14.05	46.25	3.29	21.85	1.56
	387	7.00	24.81	76.54	3.09	42.56	1.72
	389	7.33	17.32	55.41	3.20	31.18	1.80
	391	5.00	18.87	55.43	2.94	38.90	2.06
Average (15 farms)		11.18	15.86	52.43	3.30	25.50	1.61
CALIFORNIA, SPRECKELS DISTRICT.							
3-year average	395	210.00	15.67	$29.80	$1.90	$60.17	$3.84
	396	97.00	13.70	36.54	2.67	25.11	1.83
	398	93.33	16.07	44.96	2.80	47.93	2.98
	399	235.00	14.37	40.40	2.81	39.81	2.77
	400	87.33	21.10	39.83	1.89	55.12	2.61
	401	83.33	13.82	32.20	2.33	30.18	2.18
Average (6 farms)		134.33	15.50	36.79	2.37	44.95	2.90

[1] Loss.

TABLE 12.—COSTS AND PROFITS OF BEET GROWING, BY FARMS AND BY DISTRICTS; AVERAGES FOR THE THREE YEARS, 1911, 1912, AND 1913—Continued.

CALIFORNIA, OXNARD DISTRICT.

	Farm No.	Acres.	Yield per acre.	Expense per acre.	Expense per ton.	Profit per acre.	Profit per ton.
			Tons.				
3-year average	406	115.33	11.00	$31.48	$2.86	$45.80	$4.16
	407	74.00	9.51	30.92	3.25	31.00	3.26
	410	50.00	15.27	34.72	2.27	48.03	3.15
	411	416.67	14.36	29.31	2.04	56.85	3.96
	412	1,640.00	10.57	36.58	3.46	34.04	3.22
Average (5 farms)		459.20	11.34	34.78	3.07	38.97	3.44

CALIFORNIA, LOS ANGELES DISTRICT.

3-year average	413	66.50	16.91	$43.61	$2.58	$40.20	$2.38
	414	27.67	17.43	41.29	2.37	65.70	3.77
	415	12.67	14.53	38.13	2.62	49.03	3.38
	418	45.00	16.01	45.73	2.86	45.16	2.82
	421	76.33	13.30	43.15	3.25	30.82	2.32
	423	129.00	10.29	31.25	3.04	32.29	3.14
	424	150.00	6.74	30.16	4.47	11.03	1.64
	425	124.33	9.57	32.62	3.41	21.22	2.22
	427	35.00	21.17	38.17	1.80	99.43	4.70
	428	55.00	9.33	31.47	3.37	27.53	2.95
	429	146.67	16.91	47.58	2.81	53.01	3.13
	430	83.67	10.97	31.91	2.91	25.29	2.31
	431	126.67	14.32	36.23	2.53	46.78	3.27
	433	81.67	9.28	34.77	3.75	30.50	3.29
	434	75.00	10.90	36.37	3.34	26.96	2.47
	435	436.67	14.82	38.84	2.62	50.88	3.43
	436	250.00	10.40	43.78	4.21	15.92	1.53
	437	30.00	13.56	39.11	2.89	44.26	3.26
	438	161.67	13.30	46.17	3.47	31.06	2.34
	439	135.00	18.50	49.65	2.68	45.01	2.43
	440	34.67	20.46	40.18	1.96	69.29	3.39
	441	156.67	17.82	46.98	2.64	59.11	3.32
	442	110.00	15.83	34.41	2.17	53.49	3.38
	443	124.00	17.01	30.86	1.81	66.49	3.91
	444	90.00	9.63	33.67	3.50	7.22	.75
	448	18.67	17.48	38.58	2.21	71.83	4.11
	449	49.67	17.42	41.56	2.38	64.90	3.72
	450	253.00	15.00	46.40	3.09	35.60	2.37
	451	213.33	9.52	39.67	4.17	20.71	2.18
	452	13.67	14.63	35.13	2.40	48.90	3.34
Average (30 farms)		110.41	13.48	39.69	2.94	38.34	2.84

No details of cost are shown in the foregoing table for the reason that the variations in the several items of cost are sufficiently indicated in Table 11. The size of farms ranges from less than two acres to several hundred and the average yield per acre shows a very wide range. These facts indicate the general representative character of the farms included. The farms represented in this table probably show results considerably above the average of all farms in the respective districts because more accurate information could generally be obtained for them. No effort, however, was made to secure statements from the best farmers only, and as a matter of fact the results of a number of rather indifferent farmers are included in the table. It is believed that these figures show in general what fairly good farmers have done.

In arriving at profits it should be borne in mind that every item of actual expense has been considered. Nothing, however, has been allowed for depreciation of equipment or rental value of land, nor has anything been allowed for superintendence by the farmer. On the other hand, where the farmer or any member of his family did any part of the work he was allowed the customary rate of hire for men with teams, which would include repairs of tools. It may be noted that if beets were not grown some members of the family, particularly children, would earn nothing at all. The profits shown by these farms, therefore, is what is left after a fair allowance has been made for the work of the farmer and the members of his family and also for the hire of his teams.

For reasons already stated nothing has been allowed for the value of tops or pulp. If this had been done many of these farms would show considerably larger profits. It is probable that in most cases the tops are worth enough to more than pay the taxes on the land. It is known that in some cases they would much more than do this.

RELATION OF PROFITS TO YIELD.—The importance of a large yield is brought out in the table with striking emphasis. As a rule a yield of less than from 7 to 10 tons per acre shows a small profit and 12 tons or above show good net returns. There are some exceptions but not enough to disprove the rule. The cost of growing an acre of beets, except the expense of harvesting, does not differ materially in a given locality, whether the yield is 10 tons or 20 tons. It is apparent, therefore, that every ton above a yield necessary to meet expenses is nearly all profit. For example farm No. 142 in the northern Wisconsin district showed an average profit of only $2.36 an acre. It cost this farmer $40 to grow about 8½ tons of beets. He received an average price of $5 per ton. If his yield had been 12½ tons per acre he would have received as additional profit the value of 4 tons less the expense of hauling, which was about 60 cents per

ton. Therefore his net profits with 12½ tons would have been about $20 per acre instead of $2.36.

A comparison of the yield per acre with the expense per ton clearly reveals the importance of a high yield. In many cases of low yield shown in the table the farmer received barely enough to meet his expenses. This was rarely ever the case where the yield was high. In Kansas where the yield of the 4 farms involved was uniformly low the net profits per acre were correspondingly low, and in northern Colorado where the yield was generally high the profits were correspondingly high.

AVERAGE RESULTS BY DISTRICTS.—The average results of a district is a better standard by which to measure profits than are the results of any single farm. A summary by the districts represented in Table 12 is shown in Table 13 below:

TABLE 13.—AVERAGE COSTS AND PROFITS, BY DISTRICTS, FOR THE 3 YEARS 1911, 1912, AND 1913.

District.	Acres.	Yield per acre (tons).	Expense per acre.	Expense per ton.	Profit per per acre.	Profit per per ton.
Ohio-Indiana	14.79	11.85	$37.70	$3.18	$23.59	$1.99
Michigan, lower peninsula	17.90	10.92	41.15	3.77	17.80	1.63
Wisconsin:						
Northern district	11.98	11.83	39.77	3.36	23.83	2.02
Southern district	7.18	14.15	42.72	3.02	33.68	2.38
Minnesota	7.84	12.56	40.77	3.25	22.84	1.82
Iowa	48.70	11.92	34.71	2.91	25.12	2.11
Nebraska	10.02	12.39	34.12	2.75	27.84	2.25
Kansas	41.38	7.52	30.20	4.02	8.20	1.09
Colorado:						
Northern district	37.19	14.77	46.29	3.13	34.48	2.33
Southern district	29.85	13.12	40.11	3.06	37.46	2.86
Grand Junction district	34.22	14.99	51.45	3.43	27.14	1.81
Montana	26.57	12.90	43.56	3.38	36.03	2.79
Idaho	30.37	15.30	54.45	3.56	22.06	1.44
Utah:						
Northern district	22.58	16.73	42.04	2.51	37.54	2.24
Central district	11.18	15.86	52.43	3.30	25.50	1.61
California;						
Spreckels district	134.33	15.50	36.79	2.37	44.95	2.90
Oxnard district	459.20	11.34	34.78	3.07	38.97	3.44
Los Angeles district	110.41	13.48	39.69	2.94	38.34	2.84

The return per acre is a better test of profitableness than the net return per ton. By this test it would appear that beet growing is most profitable in California, though Utah has the higher yield. By reference to the tables it will be noticed that the expense per acre in Utah is considerably greater than in California. This is mainly due to considerable cost for fertilizing materials in the former State. It

should be noted also that the price per ton paid the farmer in Utah is lower than in California. Among the most important beet-growing States Michigan has the lowest yield and the smallest net return per acre. This State has comparatively high costs due to the high cost of fertilizer. The average net returns do not fall below $22 per acre in any district except Kansas and the lower peninsula of Michigan. Whether or not the profits in beet growing are sufficient to encourage cultivation depends in a measure upon how they compare with those that can be realized from growing other crops.

Section 10. Profits from beets compared with profits from other crops.

While the absolute profits from growing beets may be high, this does not of itself indicate that they are the best crops to grow, because some other crops may yield better returns. Of course there must always be taken into consideration the quantity of product that can be marketed at a profit. Thus an acre of cabbage may yield twice as great a return as an acre of beets, but if upon planting as many acres in cabbage as he does in beets the farmer finds that he has oversupplied the market his profit may disappear.

There are no definite figures showing the profits in crops generally to indicate precisely how the profits from beet growing compare with profits from other crops. The average annual gross returns and the average annual profit per acre of beets in the various districts heretofore discussed are shown in the statement below. These are averages for three years and are summarized in round figures as follows:

	Average annual gross returns per acre.	Average annual net profits per acre.		Average annual gross returns per acre.	Average annual net profits per acre.
Ohio-Indiana	$61.00	$23.00	Montana	$79.00	$36.00
Michigan, lower peninsula	59.00	17.00	Idaho	76.00	22.00
Wisconsin:			Utah:		
Northern district	63.00	23.00	Northern district	79.00	37.00
Southern district	76.00	33.00	Central district	77.00	25.00
Minnesota	63.00	22.00	California:		
Iowa	59.00	25.00	Spreckels district	81.00	45.00
Nebraska	61.00	27.00	Oxnard district	73.00	39.00
Kansas	38.00	8.00	Los Angeles district	78.00	38.00
Colorado:					
Northern district	80.00	34.00			
Southern district	77.00	37.00			
Grand Junction district	78.00	27.00			

Assuming that wheat is ordinarily worth $1 per bushel delivered at the railroad station, the lowest yield in any of the districts in question that would give a gross return equivalent to the gross return on beets

would be 38 bushels per acre. While the average cost of growing an acre of wheat has not been investigated, it is undoubtedly very much less than the cost of growing an acre of beets. A comparison of wheat with beets upon the basis of net profits on beets would indicate that, with the exception of Kansas, the farms in these districts would have to show from 17 to 45 bushels of wheat per acre above the quantity needed to pay all expenses before the results would be equal to the results from beets. Thus the beet farmers in Nebraska, after paying in wheat at $1 per bushed for all expenses incident to growing, harvesting, and marketing an acre of wheat, should have 27 bushels left in order to equal the results from beets. On the same basis those in Ohio, Indiana, and the northern district of Wisconsin should have 23 bushels, those in northern Colorado 34 bushels, those in Montana 36, those in Utah from 25 to 37, and those in California from 38 to 45. It is certain that such results in wheat could not be realized. Corn, on the basis of 50 cents a bushel, would require twice the quantity of surplus bushels as in the case of wheat.

In some of the States, particularly in the West, alfalfa is a very important crop and is considered profitable. On the basis of $10 per ton net the beet growers in those States would require a crop that would pay all expenses and leave from 2 to 4 tons per acre remaining as profit. Similar comparisons might be made with other staple crops.

It is not probable that any important standard crop would year after year yield better net returns per acre than beets. Many farmers insist, however, that they are entitled to a better return on beets than on most other crops. There is some reason for this contention because of the care and diligence necessary to cultivate beets as compared with general field crops and the unusually large outlay of cash for labor. The ordinary farmer can not care for as many acres of beets as he can of general field crops. It is probable that a given number of laborers can plant, cultivate, and harvest three times as many acres of corn as of beets and from five to six times as many acres of such small grains as wheat. Thus the smaller return per acre for these crops might be as profitable to the farmer who owns a large or fairly large farm as the larger returns per acre from the much smaller acreage of beets. This is an important factor to take into account when considering the profit on beets. On the other hand, it should be noted that the beet grower sells his crop at a fixed price before it is planted. He is thus assured that if he has a good crop he will receive a definite return. In other words, he assumes no risk as to conditions in the market. This is a very important advantage and is an offset to some of the disadvantages noted.

An important consideration in this connection is the peculiar adaptation of beets to the conditions existing in certain districts.

Some beet regions of the West are long distances from markets for other crops. Grain and hay, for example, are so bulky that the freight rates do not permit their reaching profitable markets. Beets, on the other hand, can be sold near by, with a consequent low carrying charge. Furthermore, practically all the lands in the beet-growing sections of the West must be irrigated. When this is properly done it is usually quite expensive. This makes it desirable to grow crops that yield large net returns per acre. In many sections beets meet this requirement, perhaps, more satisfactorily than any other crop.

After taking into account all of the above considerations it does not seem probable that intelligent beet growers can reasonably hope for more satisfactory returns from other crops than from beets. It is evident that this feeling prevails to a wide extent among those farmers who have engaged in this branch of farming. There are some who have abandoned this crop for various reasons, in part, no doubt, because of the exacting nature of the crop, and also because of a lack of water and difficulties in securing labor. But, on the other hand, a very large proportion of the beet growers desire to continue and sometimes express deep concern over the possibility of the closing of factories. It is not reasonable to suppose that the farmers would manifest such keen interest in the beet-sugar industry if they did not find it profitable. Their protest against any reduction in the price of beets is natural, but taken alone affords no indication that this branch of farming has not been profitable.

CHAPTER III.

COST OF PRODUCING BEET SUGAR.

Section 1. Introduction.

The cost tables shown in this report cover the average results of the five campaigns or seasons beginning with the year 1909–10 and ending with the year 1913–14. During this time 78 different factories made sugar, but not all of them were operated in any one year. Three of these factories were moved during this period, so sugar was made in 81 different places. The greatest number producing sugar in any campaign during the period was 73 in 1912–13. There were some idle factories and some new ones were built during the period covered. Cost statements were secured for 76 different establishments. The greatest number covered for any one year was 73, for 1912–13. On account of losses on beets due to weather conditions the data for one factory show such abnormal results that they are not included in any of the cost tables.

In this investigation access was had to all the records and books of account of all the active factories in the United States except one unimportant concern. The data were taken in such detail as to show separately each important item of cost. The accounts of all the companies were not kept in precisely the same form, but there was generally little difficulty in making such adjustments as to place them all on an exactly comparable basis. In order to insure absolute accuracy the cost statements were in every case made up from the books of the companies and checked with their balance sheets, profit and loss accounts, and income statements.

COSTS COVER ONLY THE SUGAR MANUFACTURING BUSINESS.—Several beet-sugar companies are also engaged in other business than manufacturing sugar, such as farming and cattle feeding. Some of them own or control irrigation projects and other outside interests. In all such cases these outside operations have been separated from the sugar business and only the latter is included in the cost tables. Likewise the cost of marketing sugar has been kept distinct from manufacturing costs except in two unimportant particulars. First, the proportion of general administrative expense properly chargeable to selling could not be separated from the total administrative expense with any degree of accuracy. For this reason all of this expense has been charged into the cost of manufacture. The amount

of this item chargeable to selling is so small per 100 pounds of sugar produced as not appreciably to affect the total cost. Second, amounts paid for insurance on sugar in warehouses at the point of manufacture could not be separated from insurance on plant and it has been charged in the cost of production. Insurance on sugar in transit or in storage at distribution points away from the place of production has been charged to selling expense.

In analyzing certain miscellaneous expenses it was sought to eliminate every item not properly chargeable to sugar. In a few instances there was some doubt as to certain charges. For example, there were sometimes small miscellaneous gains and losses that could not be identified. These were included in the cost statements, but the amounts involved were always extremely small and the average costs are not materially affected thereby.

BASES OF COST COMPUTATIONS.—The cost of production is shown on two bases. In one case the unit is 100 pounds of sugar, and in the other case the unit is a ton of beets. Practically all the discussion of the cost of producing sugar is based upon the sugar produced. For this reason the tables computed upon this basis are much more detailed and elaborate than those based upon the tonnage of beets worked. The computations on the latter basis, however, are of considerable interest and value, particularly in connection with any study of the efficiency of plants.

The tables based upon the cost of 100 pounds of sugar show the details for the entire period for all factories operating not less than 3 years during the period 1909–10 to 1913–14. They also show the cost by States for the 5 years and a summary for groups of factories arranged according to a certain range of cost. The average cost of working a ton of beets is shown for the 5-year period.

IDENTITY OF FACTORY CONCEALED.—The identity of no factory is disclosed in any of the cost tables. Each factory is given a number and this number is different from the same factory in different tables. It is thus impossible from these tables for one manufacturer to ascertain the costs of another. In many cases beet sugar manufacturers have furnished their costs in considerable detail to various committees of Congress and such companies doubtless would not object to identifying their figures. Others, however, who have not thus freely disclosed their costs might reasonably object to having their factories identified. Since no useful purpose would be served by revealing the costs of individual factories or companies, they are not disclosed in this report.

Section 2. Proportion of total production covered by cost tables.

The total production of beet sugar in the United States during the 5 years covered by the cost tables in this report was 3,020,800 short

tons. Of this 2,904,626 tons, or more than 96 per cent of it, are covered by the principal table, which shows the average cost of production for 5 years by factories. The table showing the cost by States covers 2,981,112 tons, or nearly 99 per cent of the total quantity produced during the 5-year period. The table by States includes more sugar than the one by factories, because some factories operating less than 3 years were excluded from the latter to avoid disclosing their identity. The table by factories includes the operations of 64 factories, while that for States includes the operations of 75.

Section 3. Details of elements of cost.

The books of most of the companies made it necessary to make two general groups of items for the cost statement. The first group includes the cost of beets and the cost of factory operation. The second group includes the charges for general administrative expense, taxes, interest, rentals, results from farming in those cases where farms were operated, and a number of miscellaneous gains and losses. A statement of the form in which these data were obtained is shown below:

GROUP 1.

1. Procuring and supervising beet acreage.
2. Purchased beets and company-grown beets.
3. Freight paid on beets.
4. Other expenses, handling and receiving beets.
5. Coke.
6. Coal.
7. Fuel oil.
8. Lime rock and burnt lime.
9. Sugar bags, barrels, and twine.
10. Filter bags and cloths.
11. Oil, waste, etc.
12. Operating labor.
13. Factory salaries, officers, clerks, storemen, and watchmen.
14. Repairs and maintenance.
15. Insurance.
16. General and miscellaneous factory expense.
17. Stock in process from preceding year.
18. Stock in process at end of year.
19. Pulp produced.
20. Molasses sold.

GROUP 2.

1. General administration expense.
2. Taxes.
3. Miscellaneous gains and losses.
4. Depreciation.
5. Interest.
6. Rentals.
7. Farming and land operations.

All the items in group 1, from 1 to 17, inclusive, are debit items in the cost account. Items 18, 19, and 20 are credit items, and their sum is deducted from the total of the other items. Thus the stock in process at the end of the year was credited because it appeared in the next year's operations. The pulp and molasses produced and sold were credited to the sugar account and thus the cost was reduced to that extent. The items in this group make up the net manufacturing cost.

Some of the items in group 2 are not properly chargeable to the sugar account. General administrative expense, taxes on the beet-sugar plant and equipment and depreciation are properly chargeable to cost. Interest was not included in the cost tables for reasons stated elsewhere (see p. 65). Miscellaneous gains and losses when pertaining to sugar manufactures were credited or charged to the cost account, as the case may be, but such items if arising from transactions that did not pertain to the manufacture of sugar were disregarded. For instance, any gain or loss on account of the feeding of cattle or the operation of a farm was not charged to the cost of sugar. Rentals refer to rent paid for offices and have been included in cost.

The explanation of variations in the cost of some items, such as insurance and taxes and office expenses, are generally obvious. Speaking broadly these expenses are practically fixed, and if a factory for any reason has a small production as compared with its capacity they are of course unduly high per unit of production. On the other hand, variations in the cost of fuel, supplies, and labor can not be so accounted for.

DETAILS OF CERTAIN COST ITEMS.—A number of the separate cost charges are made up from numerous small items. The details of some of the charges in group 1 above are here shown.

The charge in item 1 for beet acreage consists of salary and expense of superintendent and automobile expense.

Other expense for beets which is covered by item 4 includes 11 separate charges as follows:

Receiving labor in beet sheds.
Receiving material in beet sheds.
Unloading beets.
Maintenance of receiving stations.
Piping or siloing beets.
Depreciation (beet dumps).
Traveling expenses of supervision.
Beet implements (expense or earnings).
Agricultural stable.
Transportation of laborers.
Procuring of laborers.

The charge for oil, waste, etc., item 11, includes the following 16 separate items:

Sulphur.
Knives, files.
Hardware.
Pipe, valves, and fittings.
Lubricants and waste.
Rubber goods and packing.
Factory chemicals.
Laboratory supplies.
Electrical supplies.
Water and drainage.
Belting and laces.
Machinery parts and castings.
Rubber boots and oiled suits.
Centrifugal supplies.
Tubes.
Kieselguhr.

Factory salaries of officers, etc., included in item 13, embrace salaries of managers, superintendents, main office, and superintendents' clerks, and watchman and storeroom employees.

Item 16, which covers general and miscellaneous factory expense, includes the following:

Telegrams and telephones.
Main office supplies.
Managers' traveling expenses.
Superintendent's office expenses.
Superintendent's traveling expenses.
Special supervision expenses.
Special engineering expenses.
Stable.

Item 12, which covers operating labor, includes expenditures under 13 heads, as follows:

Supervision.
Main house.
Boiler house.
Steffens house.
Limekilns.
Laboratory.
Sugar warehouse.
Machine shop.
Water drainage.
Yards.
Securing labor.
Bonus.
Miscellaneous.

INTEREST EXCLUDED FROM COST.—Interest is charged for the use of money and obviously can form no part of the cost of production. Money borrowed will buy as much material or hire as much labor as money owned. Interest on borrowed money, therefore, has no effect upon the cost of production. It does have, however, a material effect upon the financial results of a business, and this is taken into account in the discussion of profits on investment.

Section 4. Depreciation.

None of the beet-sugar companies charged any depreciation on plant and factory equipment in their cost accounts, but some of them deducted depreciation from their earnings. Such deductions, however, were not based on any consistent plan. Some years this charge was very much more than in others, and in some years there was no charge at all. If the business was prosperous, the charge for depreciation was very high, and when business was poor and profits not large, the depreciation charge was small if made at all. Very few, if any, of the companies have taken account of depreciation for as many as five consecutive years. For these reasons, the actual charges for depreciation made by the companies have been disregarded, and instead a reasonable allowance has been made and included in the cost of manufacture. It is obvious that some allowance should be made for depreciation. It is impossible indefinitely

to maintain a beet-sugar factory in a high state of efficiency by ordinary repairs.

In the beet-sugar industry, the depreciable property consists of factory buildings and equipment, beet sheds, office furniture and fixtures, and beet stations. In this discussion beet sheds are considered as a part of the factory buildings. Many of the companies have included depreciation on stations and office furniture and fixtures in the cost of manufacture, and therefore in the computations with respect to depreciation made by the Commission those comparatively insignificant items have not been considered.

The actual depreciation depends upon a number of conditions, and these conditions vary in different plants. All property does not depreciate at the same rate. Machinery deteriorates more rapidly than buildings, and some machines more rapidly than others, and likewise some buildings are more durable than others, either because of the nature of their use, by reason of the character of the materials used in their construction, or, as between different localities, on account of differences in climatic conditions. The life of a building or machine depends not only upon the factors just mentioned, but also upon the extent to which the property is kept up by repairs. If buildings are well constructed of brick and concrete and steel framework, they will endure for a long time with comparatively slight expenditure for repairs. This type of building prevails in the beet-sugar industry. The life of machinery and other equipment is much shorter than that of buildings. Some machines, however, if kept in repair will give efficient service for many years. On the other hand, there are some machines whose life is comparatively short under the most favorable circumstances. The actual depreciation depends upon the life of the property.

The rate of depreciation for cost-accounting purposes must be fixed in advance according to previous experience and therefore is necessarily somewhat theoretical and arbitrary. The method employed in arriving at the charge for depreciation used in this report is here described in detail. It is believed that this method is fair, but it is not claimed to be absolutely accurate. It should be noted in this connection that in the cost accounts of the beet-sugar companies liberal charges are made for maintenance and repairs, and this fact tends to support the conclusion that the allowances for depreciation made by the Commission are liberal.

METHOD OF ARRIVING AT A DEPRECIATION CHARGE.—In order to determine a proper charge for depreciation, the first step is to determine the actual investment in depreciable property; the second step is to determine a proper rate of depreciation. It was possible to ascertain the actual cost of investment in the buildings and equipment of

a factory with accuracy in many cases, and with approximate accuracy in others. A proper rate of depreciation is estimated on the basis of the anticipated life of the depreciable property. The estimates adopted were based upon certain concrete facts coupled with the judgment of men familiar with the business.

Cost of plant investment.—The factory buildings and equipment, including beet sheds and other outbuildings of the factory, have been considered in connection with plant investment. The cost of investment in buildings and machinery and other factory equipment was ascertained by an analysis of the property account in connection with construction accounts wherever the latter were available. When construction accounts were not available there was usually a record of some transaction in connection with the capitalization of the company that shed some light on the cost of property. The books always showed the cost of additions to buildings and equipment, and if any reductions had been made for depreciation they were also shown in the books. The approximate cost of the buildings and equipment for a beet-sugar factory of a given capacity is fairly well established. This figure also assisted in determining the real value or cost of a plant where definite information was not available. With these various facts known it was usually possible to make such adjustments of accounts as to show practically accurate cost of investment in plant and other property.

The methods will be better understood by illustrative examples. If, for instance, the construction of a plant shows a cost of, say, $350,000 and additions have cost $50,000, the total investment is $400,000. In a case of this sort the cost of investment is absolutely accurate. In a case where no construction account was available, of course, a different method had to be followed. Suppose in another case the buildings and equipment were carried on the books at $500,000. The books also showed that at various times depreciation to the amount of $60,000 had been charged off. The sum of these two items, or $560,000, would indicate the actual cost of the property provided the actual cost of construction was $500,000. This, however, was not always the case. An examination of all the books of account would generally show the amount of working capital and any other assets separately. If in this case those items amounted to, say, $140,000, the actual cost of all the property of the concern would appear to be $700,000, and this amount was covered by the issued capital stock of the company. It was found, however, that $100,000 of this stock was given as a bonus or that the stock was issued at such a price as to make the discount equivalent to $100,000. It would be apparent, therefore, that the property cost $100,000 less than the books showed, or in this case $600,000. This excess would generally

be found to be carried in the book value of buildings and equipment, which in this case would leave the actual cost of that item to be $460,000. This amount also included the value of the factory site. It was assumed that an ordinary factory site consists of not exceeding 40 acres and that generally this land was worth in the neighborhood of $250 per acre at the time the factory was built, thus fixing the site value at $10,000. Deducting this from the $460,000 leaves $450,000 as the cost of the factory buildings and equipment. Such figures can be checked by comparing them with the cost of a factory based on its rated capacity. Suppose that this was a 400-ton factory. The cost of buildings and equipment varies from $800 to about $1,200 per ton capacity. Thus, $450,000 for a 400-ton plant would not be considered excessive. On the other hand, if it were a 500-ton plant it would show a cost of $900 per ton capacity, and this would not be considered too small.

It should be stated that in most cases, and particularly in the case of the more important companies, it was not necessary to resort to the rather intricate method just described. There were generally found partial or complete construction accounts that enabled a practically exact determination of the cost.

Rate of depreciation.—There is a wide divergence of opinion among beet-sugar manufacturers as to what is a proper charge for depreciation. The general manager of the Great Western Sugar Co. in a letter filed with the Hardwick committee [1] stated that the amount of depreciation that should be charged for each year for the factories of that company would be from 28 to 43 cents per 100 pounds, and that a fair average for all the Colorado factories would be 35 cents per 100 pounds. On the other hand, the American Beet Sugar Co., in its annual report for the year ending March 31, 1915, set aside an appropriation of 10 cents per bag of 100 pounds for depreciation and additions. Other estimates have been made as to depreciation, the most common rate suggested being 5 per cent or 6 per cent of the value of the property.

It was found that approximately 30 per cent of the cost of depreciable property consisted of buildings and 70 per cent of machinery and other factory equipment. Allowing a depreciation rate of 3 per cent on buildings and 6 per cent on equipment, an average rate of 5.1 per cent was arrived at, and 5 per cent was adopted for computing the depreciation in the cost tables of this report. It is believed that this rate is very liberal, and while it is used in this report it should not be understood that the Commission sets it up as a standard.

[1] Hearings on Investigation of the American Sugar Refining Co. and Others, vol. 8, p. 2894.

There was computed, in the manner already explained, for each company, and in most cases for each factory where a company owned more than one factory, the average annual cost of investment for factory buildings and equipment and the depreciation thereon for each of the five years. The depreciation for a bag (100 pounds) of sugar for each factory was found by dividing the aggregate production for five years into the aggregate depreciation thus computed.

It should be borne in mind that the amount of depreciation for a given plant is generally uniform from year to year unless there have been important changes in the plant investment; that is to say, if a plant costs $1,000,000, and no important additions were made and 5 per cent is a proper rate for depreciation, then the amount charged against cost for each year would be $50,000. The rate per bag of sugar, however, would necessarily vary as the production varies. Thus, if a factory produced twice as much sugar one year as it did in another, the depreciation per bag would be half as much for the year of large production as for the year of small production. It will be seen by reference to Table 14 (see p. 72) that the depreciation ranged from 12 cents to $1.13 per 100 pounds of sugar. This variation in the rate of depreciation per bag of sugar is partly if not mostly due to the variation in the relation of production to cost of plant.

Section 5. Average cost of production for 5 years, by factories.

Obviously, the average costs for several years are more representative than the costs of a single year. Such averages are shown in Table 14 (see p. 72), which includes the results of 64 factories, each of which operated at least 3 years during the 5 years from 1909–10 to 1913–14, inclusive. Of this number 53 operated 5 years, 4 operated 4 years, and 7 operated 3 years. The factories operating less than 3 years have been excluded from the table. These 64 factories produced 5,809,253,650 pounds of granulated sugar during the period covered. This was more than 96 per cent of all the beet sugar produced in the United States during that period.

There are some factors in connection with the cost computations that slightly affect their exactness and these should be pointed out before discussing the results shown. This will be better understood by showing the cost per 100 pounds for a factory in the form of an account. Factory No. 30 in Table 14 will serve as an illustration.

Debits.		Credits.	
Beets	$2.3528	Stock in process and by-products	$0.1433
Fuel	.1376	Miscellaneous gains	.0031
Lime rock and lime	.0436		
Sugar bags and barrels	.1210		
Other supplies	.0473		
Maintenance and repairs	.1726		
Operating labor	.2706		
Administration and office expense	.1907		
Insurance and taxes	.0637		
Total cash expenditures	3.3999		
Stock in process from preceding year	.0375		
Gross cost not including depreciation	3.4374		
Depreciation	.1500		
Gross cost, including depreciation	3.5874	Total credits	.1464

Net cost, including depreciation, $3.5874—$0.1464=$3.4410.

Stock in process from preceding year represents every item of expense preceding it in the statement except that for sugar bags, but it was an expense incurred during the previous year. The stock in process at the end of the year which is credited to the cost account likewise includes every item of expense in the cost statement except bags, but it was an expense incurred in the year being considered. Thus a part of the total cash expenditure of $3.3999 includes a part of the value of the stock in process at the end of the year. Discrepancies arising on account of the difference in the value of the stocks in process at the beginning and at the end of the year, particularly in the average operations for five years, would be too small materially to affect the total average cost.

For convenience, the net value of by-products has been included with the value of stock in process at the end of the year. These by-products are pulp and molasses, with occasionally a very small amount for lime cake. The amounts included for pulp and molasses are the net profits from these sources; all costs have been deducted from gross receipts, hence there is no complication as to expenditures as in the case of stock in process. The miscellaneous gains and losses are practically always small items. They usually grow out of transactions in beet seed, adjustments of inventories, of supplies, etc. Where there is a net loss from these sources, it is of course added to the amount in the column of gross costs. In the example above there was a gain, and it was deducted.

It is thus seen that details of some of the elements entering into an adjustment of costs are indeterminate and consequently no such adjustment can be made. However, this does not materially affect the value of the tables. The most important item in the tables is the net factory cost, and that is accurate. The other items would be changed but slightly by any adjustment.

Each factory has been given a number to prevent its identification. The reason that the serial numbers do not always run consecutively is that each factory was given a number regardless of the number of years it operated, and the omission of a serial number is due to the omission of the factory represented. While there are only 64 factories represented in Table 14, the highest serial number is 74. The net cost is shown both excluding and including depreciation.

TABLE 14.—COST OF PRODUCING 100 POUNDS OF GRANULATED SUGAR, BY FACTORIES—AVERAGES FOR THE 5 YEARS 1909-10 TO 1913-14, INCLUSIVE.

[NOTE.—To prevent identification each factory is represented by a number and the same number is not used more than once for the same factory in any of the tables.]

Factory No.	Beets.	Fuel.	Lime rock and lime.	Sugar bags and barrels.	Other supplies.	Maintenance and repairs.	Operating labor.	Administrative and office expenses.	Insurance and taxes.	Stock in process from last year.	Gross factory cost.	Credits.			Net factory cost not including depreciation.	Depreciation.	Net cost including depreciation.
												Stock in process and by-products.	Miscellaneous gains or losses (net). [1]	Total.			
1....	$3.0896	$0.1898	$0.0529	$0.1239	$0.0520	$0.1433	$0.2368	$0.2113	$0.1251	$0.0888	$4.3135	$0.3795	—$0.0099	$0.3696	$3.9439	$0.39	$4.3339
2....	3.4896	.2831	.0922	.1214	.0561	.2141	.3882	.1971	.0722	.2078	5.1218	.4455	.0689	.5144	4.6074	.39	4.9974
3....	4.0992	.2377	.0680	.1331	.0381	.3542	.2439	.2094	.0139	.0600	5.4575	.5644	.0279	.5923	4.8652	.50	5.3652
4....	3.8068	.2941	.0834	.1157	.0932	.2944	.5163	.1938	.0346	.2495	5.6818	.5659	.0154	.5813	5.1005	.44	5.5405
5....	3.2680	.2763	.0887	.1365	.0375	.1955	.3966	.2054	.0522	.1403	4.7970	.4285	.0578	.4863	4.3107	.27	4.5807
6....	3.3248	.1475	.0418	.1341	.0578	.1573	.2752	.1903	.0672	.0562	4.4522	.4160	— .0324	.3836	4.0686	.28	4.3486
7....	2.8327	.1690	.0483	.1194	.0363	.1253	.3576	.1240	.0592	[2]	3.8718	[3] .3199	— .0070	.3129	3.5589	.25	3.8089
8....	3.2775	.2419	.0521	.1398	.0527	.1221	.5249	.1640	.0474	[2]	4.6224	[3] .4088	— .0097	.3991	4.2233	29	4.5133
10....	3.3326	.1889	.0521	.1200	.0476	.0637	.2781	.2058	.1036	.0541	4.4465	.3793	— .0040	.3753	4.0712	.25	4.3212
11....	3.2678	.2231	.0385	.1156	.0477	.0767	.2963	.2123	.0968	.0501	4.4249	.5021	.0048	.5069	3.9180	.28	4.1980
12....	3.1247	.2573	.0476	.1389	.0400	.2262	.2612	.1801	.0865	.0523	4.4148	.4983	.0074	.5057	3.9091	.26	4.1691
13....	3.1562	.2138	.0481	.1338	.0430	.1763	.2305	.1597	.0502	.0456	4.2572	.4989	.0264	.5253	3.7319	.21	3.9419
14....	2.8280	.2192	.0548	.1344	.0483	.1455	.2679	.1470	.0331	.0389	3.9171	.3281	.0146	.3427	3.5744	.21	3.7844
15....	2.8779	.2185	.0701	.1408	.0510	.2276	.2989	.1778	.0535	.0344	4.1505	.2677	.0033	.2710	3.8795	.27	4.1495
16....	3.0932	.2349	.0510	.1378	.0720	.2267	.3459	.1909	.0326	.0616	4.4366	.3800	— .0079	.3721	4.0645	.27	4.3345
17....	2.7293	.1731	.0310	.1346	.0340	.1471	.1941	.1474	.0313	.0322	3.6541	.4522	.0284	.4806	3.1735	.20	3.3735
18....	4.4826	.2913	.0812	.1268	.0456	.1673	.3742	.1949	.0280	.1296	5.9215	.5935	.0090	.6025	5.3190	.25	5.5690
19....	3.4178	.2269	.0573	.1118	.0369	.1729	.3353	.1282	.0693	.0722	4.6286	.3032	— .0001	.3031	4.3255	.26	4.5855
20....	3.4657	.2134	.0631	.1291	.0612	.2012	.2871	.2412	.0726	.0948	4.8294	.3178	.0079	.3257	4.5037	.29	4.7937
21....	3.0602	.2187	.0232	.1382	.0292	.1684	.3156	.0808	.0486	[2]	4.0829	[3] .3689	.0052	.3741	3.7088	.21	3.9188

23....	3.1783	.3663	.0761	.1371	.0679	.1585	.2936	.2001	.0589	.1110	4.6478	.4156	— .0244	.3912	4.2566	.38	4.6366
24....	3.6718	.4559	.0556	.1321	.0765	.2663	.4774	.1973	.0117	.0618	5.4064	.3937	— .0601	.3336	5.0728	.39	5.4628
25....	3.5510	.1948	.0312	.1373	.0817	.2869	.3751	.2124	.0869	.0705	5.0278	.3490	— .0338	.3152	4.7126	.30	5.0126
26....	3.8698	.1867	.0478	.1391	.0478	.1044	.3858	.2253	.0335	.0318	5.0720	.6888	— .0534	.6354	4.4366	.37	4.8066
29....	3.2449	.3883	.0661	.1072	.1524	.3876	.5245	.4797	.0990	.4382	5.8879	.7754	.0312	.8066	5.0813	.34	5.4213
30....	2.3528	.1376	.0436	.1210	.0473	.1726	.2706	.1907	.0637	.0375	3.4374	.1433	.0031	.1464	3.2910	.15	3.4410
31....	2.2858	.2931	.1365	.1093	.0745	.3869	.2814	.2840	.0793	.0567	3.9875	.1037	.0020	.1057	3.8818	.57	4.4518
34....	2.4360	.1672	.0760	.1133	.0575	.1909	.2795	.2113	.0620	.0626	3.6563	.0963	— .0060	.0903	3.5660	.21	3.7760
35....	2.5465	.2370	.0645	.1143	.0470	.1136	.2857	.2077	.0269	.0302	3.6734	.1510	— .0126	.1384	3.5350	.22	3.7550
36....	2.6878	.1709	.0643	.1126	.0403	.1646	.2159	.2488	.0678	.0892	3.8622	.3311	— .0007	.3304	3.5318	.23	3.7618
37....	2.6055	.1502	.0638	.1143	.0411	.1360	.2342	.2187	.0578	.0341	3.6557	.2826	— .0012	.2814	3.3743	.21	3.5843
38....	2.3056	.1296	.0829	.1153	.0447	.1311	.2144	.1793	.0451	.1065	3.3545	.1657	— .0053	.1604	3.1941	.17	3.3641
39....	2.6129	.1619	.0587	.1133	.0479	.1521	.2006	.2298	.0635	.0293	3.6700	.2813	.0021	.2834	3.3866	.33	3.7166
40....	2.6164	.1543	.0574	.1134	.0421	.1584	.2267	.2576	.0613	.0342	3.7218	.2611	.0086	.2697	3.4521	.23	3.6821
41....	2.3128	.1255	.0808	.1156	.0463	.1296	.2294	.1868	.0453	.1181	3.3902	.1609	— .0057	.1552	3.2350	.18	3.4150
42....	2.3462	.1673	.0891	.1121	.0573	.1804	.2644	.1843	.0492	.1411	3.5914	.1928	— .0020	.1908	3.4006	.17	3.5706
43....	2.3243	.2075	.0837	.1126	.0398	.1638	.2660	.2207	.0548	.1217	3.5949	.1809	.0094	.1903	3.4046	.18	3.5843
44....	2.5840	.1427	.0640	.1130	.0501	.1470	.2256	.2322	.0565	.0552	3.6703	.2902	.0126	.3028	3.3675	.29	3.6575
45....	2.4860	.2453	.1264	.1183	.0555	.2896	.3718	.3439	.1301	.1515	4.3184	.1973	— .0224	.1749	4.1435	.82	4.9635
46....	2.6365	.1811	.1113	.1237	.0455	.2172	.2858	.2899	.0750	.0532	4.0192	.1200	.0006	.1206	3.8986	.30	4.1986
47....	2.3060	.2436	.0848	.1130	.1103	.2043	.3336	.4020	.1207	.1699	4.0882	.3359	— .0009	.3350	3.7532	.44	4.1932
48....	2.8784	.6121	.1459	.1145	.1023	.0934	.6835	.5237	.1139	.1465	5.4142	.4246	— .3269	.0977	5.3165	1.13	6.4465
50....	2.4514	.2971	.0669	.1077	.0890	.4705	.5719	.2990	.1941	.3394	4.8870	.5260	— .1839	.3421	4.5449	.63	5.1749
51....	2.1191	.1913	.0298	.1168	.0409	.2015	.2825	.1702	.0563	.0738	3.2822	.1895	— .0056	.1839	3.0983	.18	3.2783
52....	2.0756	.1838	.0379	.1159	.0432	.2218	.2816	.1525	.0621	.0806	3.2550	.1803	.0147	.1950	3.0600	.17	3.2300

[1] Minus (—) quantity in this column indicates a loss which is added to the gross factory cost before value of stock in process and by-products is deducted.
[2] Factory did not carry over any stock in process.
[3] By-products only; no stock in process carried over.

TABLE 14.—COST OF PRODUCING 100 POUNDS OF GRANULATED SUGAR, BY FACTORIES—AVERAGES FOR THE 5 YEARS 1909-10 TO 1913-14, INCLUSIVE—Continued.

Factory No.	Beets.	Fuel.	Lime rock and lime.	Sugar bags and barrels.	Other supplies.	Maintenance and repairs.	Operating labor.	Administrative and office expenses.	Insurance and taxes.	Stock in process from last year.	Gross factory cost.	Credits.			Net factory cost not including depreciation.	Depreciation.	Net cost including depreciation.
												Stock in process and by-products.	Miscellaneous gains or losses (net).	Total.			
53....	$2.1630	$0.2123	$0.0331	$0.1161	$0.0484	$0.2081	$0.2892	$0.1449	$0.0560	$0.0912	$3.3623	$0.2279	$0.0239	$0.2518	$3.1105	$0.19	$3.4005
54....	2.2541	.2996	.0373	.1172	.0355	.2758	.2688	.1857	.0866	.1009	3.6615	.2089	.0192	.2281	3.4334	.44	3.8734
55....	2.0835	.2133	.0396	.1114	.0338	.1404	.2322	.1976	.0856	.0979	3.2353	.1882	— .0229	.1653	3.0700	.27	3.3400
56....	2.1535	.2546	.0367	.1118	.0354	.1949	.2182	.1775	.0791	.1323	3.3940	.2270	.0086	.2356	3.1584	.30	3.4584
57....	2.1457	.2354	.0490	.1105	.0362	.2652	.2582	.1607	.0734	.0138	3.3481	.1017	.0276	.1293	3.2188	.22	3.4388
60....	2.0619	.1603	.0333	.1159	.0394	.1331	.1978	.1938	.0865	.0222	3.0442	.2045	— .0113	.1932	2.8510	.28	3.1310
61....	2.0964	.2941	.0532	.1132	.0435	.1856	.2575	.1928	.0923	.0460	3.3746	.1157	.0038	.1195	3.2551	.36	3.6151
62....	3.0183	.1800	.0723	.1230	.0806	.1907	.3539	.2176	.0484	.0320	4.3168	.2456	.0123	.2579	4.0589	.29	4.3489
63....	1.7907	.1879	.0642	.1228	.0322	.1459	.2072	.2036	.0878	.2209	3.0632	.3375	— .0156	.3219	2.7413	.20	2.9413
64....	1.6357	.1321	.1136	.1124	.0384	.2891	.1709	.2079	.0570	.0259	2.7830	.0685	.0051	.0736	2.7094	.28	2.9894
65....	2.5089	.2840	.0963	.1238	.0656	.0489	.3049	.2422	.0473	.0693	3.7912	.3921	.0353	.4274	3.3638	.27	3.6338
66....	2.2996	.2351	.1013	.1182	.0706	.2500	.3363	.3219	.0903	.3537	4.1770	.5010	.0064	.5074	3.6696	.29	3.9596
67....	2.7514	.3094	.0833	.1779	.0756	.0715	.5424	.2207	.0723	.0479	4.3624	.7140	.0074	.7214	3.6310	.24	3.8710
68....	2.0770	.2146	.0716	.1133	.1163	.3423	.3394	.2325	.0802	.0174	3.6046	.1263	.0545	.1808	3.4238	.23	3.6538
69....	2.0775	.1397	.0737	.1119	.0854	.1510	.2019	.1480	.0353	.0111	3.0355	.0399	.0162	.0561	2.9794	.15	3.1294
70....	2.3948	.2073	.0916	.1268	.0442	.1329	.1942	.2260	.0336	.0239	3.4753	.2387	— .0021	.2366	3.2387	.17	3.4087
71....	2.1425	.2116	.0656	.1110	.0432	.1632	.3851	.1046	.0491	.0411	3.3170	.2087	.0245	.2332	3.0838	.12	3.2038
73....	1.9930	.2450	.0951	.1280	.0716	.3205	.4686	.1819	.0346	.0302	3.5685	.0811	— .0341	.0470	3.5215	.28	3.8015
74....	3.0913	.3267	.0556	.0896	.0911	.3886	.5578	.6506	.2400	.1822	5.6735	.5471	— .1615	.3856	5.2879	1.12	6.4079

One of the most conspicuous facts brought out in the table is the wide variation in net factory costs. As a rule the highest cost is found in those factories where the cost of beets per 100 pounds of sugar was highest. The lowest cost per 100 pounds of sugar, however, is not so often accompanied by the lowest cost of beets. When the abnormally high net cost is not due to an extremely high cost of beets it can usually be explained by some peculiar condition or unusual circumstance. For example, factory No. 48, excluding depreciation, had a net cost of $5.3165, while the cost of beets was only $2.8784, which was much lower than several other factories paid for beets. The cost of fuel, operating labor, and administration expense were unusually high. This factory had also unusually heavy miscellaneous losses, which could not be assigned to any particular cause and were therefore charged against sugar. The extremely high cost for factory No. 74 was largely due to very high costs for maintenance and repairs and to very high administrative and office expense.

It should be noted that when depreciation is taken into account the high cost in both factories No. 48 and No. 74 is still more conspicuous. Because of the short period of operation the production of these factories was very small, and therefore the depreciation per 100 pounds of sugar was correspondingly high, being $1.13 in No. 48 and $1.12 in No. 74. These high charges for depreciation made the cost in each of these factories exceed $6.40 per 100 pounds.

RELATION OF VARIOUS COST ITEMS TO THE TOTAL FACTORY COST.—The margin between the total cost of producing sugar, not including depreciation, and the cost of beets (see p. 77) indicates the extent to which strictly manufacturing costs influence the final cost of sugar. For example, it cost factory No. 48, $2.5358 gross per 100 pounds to manufacture sugar from its beets. Its credits for stock in process and by-products reduced this to $2.4381 as the net cost of manufacture. Its cost for fuel, operating labor and administrative expense were extremely high, amounting to $1.8193. In factory No. 18, the total net cost was almost exactly the same although the beet cost was much greater. It cost the latter factory only $1.4389 gross per 100 pounds to manufacture and the credits for stock in process and by-products reduced this to $0.8364 net. The difference in the net cost of manufacture between factory No. 18 and factory No. 48 offset the difference in cost of beets and equalized their net factory costs. While, broadly speaking, the cost of beets is the most important factor in the total cost of sugar this comparison emphasizes the importance of low manufacturing cost.

By reference to Table 14, it will be seen that the value of stock in process and by-products is very large for a number of those factories that show a low net manufacturing cost. The influence of by-products upon the net cost of sugar is discussed elsewhere. The relative

importance of the cost of beets and the other cost items is clearly brought out in Table 15 below. In this comparison only items requiring an actual cash expenditure are included and depreciation is not considered.

TABLE 15.—RELATION OF CERTAIN COST ITEMS TO NET FACTORY COST, FOR THE 5-YEAR PERIOD 1909–1913, BY FACTORIES.

[Expressed in percentages of total net factory cost, not including depreciation.]

Factory No.	Beets.	Maintenance and repairs.	Operating labor.	Administrative and office expense.	Other expenses.	Factory No.	Beets.	Maintenance and repairs.	Operating labor.	Administrative and office expense.	Other expenses.
1.....	78.3	3.6	6.0	5.4	6.7	39.....	77.2	4.5	5.9	6.8	5.6
2.....	75.7	4.6	8.4	4.3	7.0	40.....	75.8	4.6	6.6	7.5	5.5
3.....	84.3	7.3	5.0	4.3	[1].9	41.....	71.5	4.0	7.1	5.8	11.6
4.....	74.6	5.8	10.1	3.8	5.7	42.....	69.0	5.3	7.8	5.4	12.5
5.....	75.8	4.5	9.2	4.8	5.7	43.....	68.3	4.8	7.8	6.5	12.6
6.....	81.7	3.9	6.8	4.7	2.9	44.....	76.7	4.4	6.7	6.9	5.3
7.....	79.6	3.5	10.0	3.5	3.4	45.....	60.0	7.0	9.0	8.3	15.7
8.....	77.6	2.9	12.4	3.9	3.2	46.....	67.6	5.6	7.3	7.4	12.1
10.....	81.9	1.6	6.8	5.1	4.6	47.....	61.4	5.4	8.9	10.7	13.6
11.....	83.4	2.0	7.6	5.4	1.6	48.....	54.1	1.8	12.9	9.9	21.3
12.....	79.9	5.8	6.7	4.6	3.0	50.....	53.9	10.4	12.6	6.6	16.5
13.....	84.6	4.7	6.2	4.3	.2	51.....	68.4	6.5	9.1	5.5	10.5
14.....	79.1	4.1	7.5	4.1	5.2	52.....	67.8	7.2	9.2	5.0	10.8
15.....	74.2	5.9	7.7	4.6	7.6	53.....	69.5	6.7	9.3	4.7	9.8
16.....	76.1	5.6	8.5	4.5	5.3	54.....	65.7	8.0	7.8	5.4	13.1
17.....	86.0	4.6	6.1	4.6	[1]1.3	55.....	67.9	4.6	7.6	6.4	13.5
18.....	84.3	3.1	7.0	3.7	1.9	56.....	68.2	6.2	6.9	5.6	13.1
19.....	79.0	4.0	7.8	3.0	6.2	57.....	66.7	8.2	8.0	5.0	12.1
20.....	77.0	4.5	6.4	5.4	6.7	60.....	72.3	4.7	6.9	6.8	9.3
21.....	82.5	4.5	8.5	2.2	2.3	61.....	64.4	5.7	7.9	5.9	16.1
23.....	74.7	3.7	6.9	4.7	10.0	62.....	74.4	4.7	8.7	5.4	6.8
24.....	72.4	5.2	9.4	3.9	9.1	63.....	65.3	5.3	7.6	7.4	14.4
25.....	75.4	6.1	8.0	4.5	6.0	64.....	60.4	10.7	6.3	7.7	14.9
26.....	87.2	2.4	8.7	5.1	[1]3.4	65.....	74.6	1.5	9.1	7.2	7.6
29.....	63.9	7.6	10.3	9.4	8.8	66.....	62.7	6.8	9.2	8.8	12.5
30.....	71.5	5.2	8.2	5.8	9.3	67.....	75.8	2.0	14.9	6.1	1.2
31.....	58.9	10.0	7.2	7.3	16.6	68.....	60.7	10.0	9.9	6.8	12.6
34.....	68.3	5.4	7.8	5.9	12.6	69.....	69.7	5.1	6.8	5.0	13.4
35.....	72.0	3.2	8.1	5.9	10.8	70.....	73.9	4.1	6.0	7.0	9.0
36.....	76.1	4.7	6.1	7.0	6.1	71.....	69.5	5.3	12.5	3.4	9.3
37.....	77.2	4.0	6.9	6.5	5.4	73.....	56.6	9.1	13.3	5.2	15.8
38.....	72.2	4.1	6.7	5.6	11.4	74.....	58.5	7.3	10.5	12.3	11.4

[1] Other expenses exceeded by miscellaneous gains.

RELATION OF COST OF BEETS TO COST OF SUGAR.—The cost of beets indicated in Table 15 represents from less than 54 per cent to about 87 per cent of the net cost of sugar. The average for the 64 factories was about 72 per cent. Speaking broadly, those factories that paid the least for beets had the lowest costs of production. It should be kept in mind that the cost of beets used in all these cost tables is the expenditure for the beets necessary to make 100 pounds of sugar. The cost of beets per 100 pounds of sugar does not necessarily mean

a high cost per ton of beets, but a high cost for each per cent of sugar extracted. Thus $5.50 per ton for beets showing an extraction of 12 per cent is a higher price to the factory than $6 for beets showing an extraction of 14 per cent.

The relation of sugar cost to beet cost is brought out in Tables 16 and 17 below. In Table 16 the net factory cost is arranged in descending order, and in Table 17 the gross factory cost is arranged in the same way. The difference between the net factory cost shown in Table 16 and the gross cost shown in Table 17 represents the amount credited for by-products and miscellaneous gains or the amount added for miscellaneous losses. It should be noted that the value of by-products varies greatly. This is explained hereafter. (See p. 81.) The cost of beets in each factory is shown parallel to the net factory cost not including depreciation.

TABLE 16.—COMPARISON OF COST OF BEETS WITH GROSS COST OF SUGAR, NOT INCLUDING DEPRECIATION; AVERAGES FOR THE 5 YEARS 1909-10 TO 1913-14, INCLUSIVE.

[Computed on basis of 100 pounds of sugar produced.]

Factory No.	Gross cost of sugar.	Cost of beets.	Margin.	Factory No.	Gross cost of sugar.	Cost of beets.	Margin.
18	$5.9215	$4.4826	$1.4389	14	$3.9171	$2.8280	$1.0891
29	5.8879	3.2449	2.6430	7	3.8718	2.8327	1.0391
4	5.6818	3.8068	1.8750	36	3.8622	2.6878	1.1 44
74	5.6735	3.0913	2.5822	65	3.7912	2.5089	1.2823
3	5.4575	4.0992	1.3583	40	3.7218	2.6164	1.1054
48	5.4142	2.8784	2.5358	35	3.6734	2.5465	1.1269
24	5.4064	3.6718	1.7346	44	3.6703	2.5840	1.0863
2	5.1218	3.4896	1.6322	39	3.6700	2.6129	1.0571
26	5.0720	3.8698	1.2022	54	3.6615	2.2541	1.4074
25	5.0278	3.5510	1.4768	34	3.6563	2.4360	1.2203
50	4.8870	2.4514	2.4356	37	3.6557	2.6055	1.0502
20	4.8294	3.4657	1.3637	17	3.6541	2.7293	0.9248
5	4.7970	3.2680	1.5290	68	3.6046	2.0770	1.5276
23	4.6478	3.1783	1.4695	43	3.5949	2.3243	1.2706
19	4.6286	3.4178	1.2108	42	3.5914	2.3462	1.2452
8	4.6224	3.2775	1.3449	73	3.5685	1.9930	1.5755
6	4.4522	3.3248	1.1274	70	3.4753	2.3948	1.0805
10	4.4465	3.3326	1.1139	30	3.4374	2.3528	1.0846
16	4.4366	3.0932	1.3434	56	3.3940	2.1535	1.2405
11	4.4249	3.2678	1.1571	41	3.3902	2.3128	1.0774
12	4.4148	3.1247	1.2901	61	3.3746	2.0964	1.2782
67	4.3524	2.7514	1.6010	53	3.3623	2.1630	1.1993
45	4.3184	2.4860	1.8324	38	3.3545	2.3056	1.0489
62	4.3168	3.0183	1.2985	57	3.3481	2.1457	1.2024
1	4.3135	3.0896	1.2239	71	3.3170	2.1425	1.1745
13	4.2572	3.1562	1.1010	51	3.2822	2.1191	1.1631
66	4.1770	2.2996	1.8774	52	3.2550	2.0756	1.1794
15	4.1505	2.8779	1.2726	55	3.2353	2.0835	1.1518
47	4.0882	2.3060	1.7822	63	3.0632	1.7907	1.2725
21	4.0829	3.0602	1.0227	60	3.0442	2.0619	0.9823
46	4.0192	2.6365	1.3827	69	3.0355	2.0775	0.9580
31	3.9875	2.2858	1.7017	64	2.7830	1.6357	1.1473

TABLE 17.—COMPARISON OF COST OF BEETS WITH NET COST OF SUGAR, NOT INCLUDING DEPRECIATION; AVERAGE FOR THE 5 YEARS 1909-10 TO 1913-14, INCLUSIVE.

[Computed on basis of 100 pounds of sugar produced.]

Factory No.	Net factory cost of sugar.	Cost of beets.	Margin.	Factory No.	Net factory cost of sugar.	Cost of beets.	Margin.
18	$5.3190	$4.4826	$0.8364	14	$3.5744	$2.8280	$0.7464
48	5.3165	2.8784	2.4381	34	3.5660	2.4360	1.1300
74	5.2879	3.0913	2.1966	7	3.5589	2.8327	.7262
4	5.1005	3.8068	1.2937	35	3.5350	2.5465	.9885
29	5.0813	3.2449	1.8364	36	3.5318	2.6878	.8440
24	5.0728	3.6718	1.4010	73	3.5215	1.9930	1.5285
3	4.8652	4.0992	.7660	40	3.4521	2.6164	.8357
25	4.7126	3.5510	1.1616	54	3.4334	2.2541	1.1793
2	4.6074	3.4896	1.1178	68	3.4238	2.0770	1.3468
50	4.5449	2.4514	2.0935	43	3.4046	2.3243	1.0803
20	4.5037	3.4657	1.0380	42	3.4006	2.3462	1.0544
26	4.4366	3.8698	.5668	39	3.3866	2.6129	.7737
19	4.3255	3.4178	.9077	37	3.3743	2.6055	.7688
5	4.3107	3.2680	1.0427	44	3.3675	2.5840	.7835
23	4.2566	3.1783	1.0783	65	3.3638	2.5089	.8549
8	4.2233	3.2775	.9458	30	3.2910	2.3528	.9382
45	4.1435	2.4860	1.6575	61	3.2551	2.0964	1.1587
10	4.0712	3.3326	.7386	70	3.2387	2.3948	.8439
6	4.0686	3.3248	.7438	41	3.2350	2.3128	.9222
16	4.0645	3.0932	.9713	57	3.2188	2.1457	1.0731
62	4.0589	3.0183	1.0406	38	3.1941	2.3056	.8885
1	3.9439	3.0896	.8543	17	3.1735	2.7293	.4442
11	3.9180	3.2678	.6502	56	3.1584	2.1535	1.0049
12	3.9091	3.1247	.7844	53	3.1105	2.1630	.9475
46	3.8986	2.6365	1.2621	51	3.0983	2.1191	.9792
31	3.8818	2.2858	1.5960	71	3.0838	2.1425	.9413
15	3.8795	2.8779	1.0016	55	3.0700	2.0835	.9865
47	3.7532	2.3060	1.4472	52	3.0600	2.0756	.9844
13	3.7319	3.1562	.5757	69	2.9794	2.0775	.9019
21	3.7088	3.0602	.6486	60	2.8510	2.0619	.7891
66	3.6696	2.2996	1.3700	63	2.7413	1.7907	.9506
67	3.6310	2.7514	.8796	64	2.7094	1.6357	1.0737

The striking relation between beet cost and sugar cost is shown by these tables, although this relation is by no means uniform. Sometimes other items of expense overcome a comparatively low cost of beets, while, on the other hand, a low price for beets may partially or entirely counterbalance the high cost for other items. In general, however, high cost of sugar is accompanied by high cost of beets. It is seen that of the 24 factories having a net cost per 100 pounds of sugar above $3.90 only three secured their beets at a cost below $3 for each 100 pounds of sugar produced, and of the 40 factories having a net cost of sugar below $3.90 only two paid as much as $3 for beets.

While the cost of beets is by far the largest item in the cost of sugar and to a great extent the controlling element, it does not by any

means determine the factory cost. This is clearly brought out in the margin between the net factory cost of sugar and the cost of beets in Table 16. The margin in the table includes the net expense per 100 pounds of sugar except for beets.

These margins represent the cost of extracting 100 pounds of sugar from beets, not including depreciation, or, in other words, the strictly manufacturing costs. The manufacturing cost ranges from 44 cents per 100 pounds to $2.44.

Of course when the cost of beets is relatively high other cost items must be relatively low and vice versa. By reference to Table 16 it will be seen that of the 10 factories showing the lowest net cost in Table 14 only one had a cost of beets exceeding 70 per cent of the total net cost of sugar. Hence approximately 30 per cent of the cost of production in the best equipped and best located factories consists of net manufacturing costs. In other words, the relation of the cost of beets and other costs is about 7 to 3.

COST INCLUDING DEPRECIATION.—As already pointed out, the cost of depreciation is affected by the relation of output to the value of investment in depreciable property. Where a factory operates for an unusually short period, and consequently has a small production, the depreciation per 100 pounds of sugar is necessarily high. Most of the higher charges for depreciation appearing in the table are due to this fact. The short period of operation is usually due to the fact that they did not have an ample supply of beets.

The cost for depreciation, as shown in Table 14 (see p. 72), ranges from 12 cents per 100 pounds in factory No. 71 to $1.13 in factory No. 48. The average charge for all the 64 factories included in the table was 26 cents per 100 pounds. The range of the total cost of production, including depreciation, was from $2.94 in factory No. 63 to $6.45 in factory No. 48. Of the 36 factories that had an average net cost of production of less than $4 per 100 pounds 20 had a depreciation charge of not exceeding 22 cents, and only 3 had a charge exceeding 30 cents.

Section 6. Average cost of production for 5 years, by States.

As already stated, some factories operating only one or two years were omitted from Table 14 in order to avoid disclosing their identity. The average cost of all factories operating during the 5-year period can be shown by States, however, without making such a disclosure. These costs are shown in Table 18.

TABLE 18.—AVERAGE COST OF PRODUCING 100 POUNDS OF GRANULATED SUGAR, BY STATES, FOR THE FIVE YEARS 1909-10 TO 1913-14.

	Number of factories operating.	Beets.	Fuel.	Lime rock and lime.	Sugar bags and barrels.	Other supplies.	Repairs and maintenance.	Operating labor.	Administration and office expense.	Insurance and taxes.	Stock in process from last year.	Total gross factory cost.	Credits.		Net factory cost, not including depreciation.	Depreciation.	Net factory cost, including depreciation.
													Stock in process and by-products.	Miscellaneous gains.			
California	11	$2.0461	$0.1801	$0.0848	$0.1182	$0.0646	$0.1962	$0.2561	$0.1873	$0.0531	$0.0582	$3.2447	$0.1722	$0.0099	$3.0626	$0.21	$3.2726
Colorado	17	2.4737	.1621	.0789	.1145	.0521	.1673	.2558	.2277	.0599	.0892	3.6812	.2043	[1].0015	3.4784	.26	3.7384
Wisconsin	[2] 5	3.5033	.2479	.0742	.1268	.0529	.2311	.3375	.2049	.0651	.1363	4.9800	.4659	.0281	4.4860	.39	4.8760
Michigan	[2] 14	3.1653	.2119	.0504	.1305	.0468	.1663	.2929	.1658	.0559	.0483	4.3341	.3959	.0048	3.9334	.25	4.1834
Ohio	5	3.4092	.2022	.0447	.1433	.0758	.1478	.4582	.1824	.0469	.0233	4.7338	.4546	[1].0238	4.3030	.32	4.6230
Montana-Nebraska	3	2.4798	.1882	.0521	.1178	.0546	.1681	.2935	.2167	.0539	.0633	3.6880	.1903	[1].0001	3.4978	.19	3.6878
Utah-Idaho	12	2.1359	.2305	.0407	.1141	.0400	.2088	.2588	.1743	.0751	.0691	3.3473	.1733	.0084	3.1656	.26	3.4256
Other States [3]	7	2.9025	.3766	.0998	.1240	.0776	.2575	.3926	.2791	.0678	.0933	4.6708	.3313	[1].0598	4.3993	.62	5.0193
Grand total, United States	74	2.5247	.1968	.0681	.1201	.0544	.1842	.2783	.1980	.0590	.0695	3.7531	.2464	.0026	3.5041	.26	3.7641

[1] Net loss to be added to gross factory cost before deducting credit for stock in process and by-products.

[2] Factory at Menominee, Mich., included in Wisconsin, because most of its beets are supplied from Wisconsin.

[3] Includes factories at Decatur, Ind.; Garden City, Kans.; Glendale, Ariz.; La Grande, Oreg.; Waverly, Iowa; Chaska, Minn.; and Fallon, Nev.

The above table shows the cost of production for all 74 factories for 5 years. The average net factory cost per 100 pounds of sugar in the entire United States during the 5 years ending with the campaign of 1913–14, not including depreciation, was $3.5041 per 100 pounds, and $3.7641 including depreciation. The lowest average cost, including depreciation, of any State was $3.2726 in California. This was followed by $3.4256 in Utah and Idaho. The highest average cost in any State, not including depreciation, was $4.4860 in Wisconsin, and the highest cost, including depreciation, was $5.0193 for the group in scattering States. The table indicates that the factories in California, Colorado, Montana and Nebraska, Utah and Idaho are the most favorably situated for a low cost of production. These States contain 43 of the 74 factories included in the table, and they produced about 73 per cent of the total beet sugar production in the United States during 5 years. More than half of the beet sugar in the United States during these 5 years was produced in California and Colorado at an average cost of $3.28 per 100 pounds, not including depreciation.

The lowest cost of beets per 100 pounds of sugar in any State was $2.0461 in California and the highest $3.5033 in Wisconsin. The States having the lowest cost of production also had the lowest cost of beets per 100 pounds of sugar, except the States embraced in the group of "other States." The highest cost of fuel was in the group of States covering scattered factories and the lowest was in Colorado. The cost of operating labor was highest in Ohio and lowest in Colorado.

A significant fact brought out in the above table is the high value of by-products in the Lake States. The amounts in the column showing credits for stock in process and by-products are mainly for by-products consisting of pulp and molasses. This is true of Ohio, Michigan, and Wisconsin, and it is also true of the group of States including the factories in Indiana, Iowa, and Minnesota. This large credit for by-products in these States is due to the great value of pulp. The factories in the Western States are so situated that they must dispose of their pulp in the green state at the factory, since freight rates as a rule do not permit the shipping of dried pulp to the chief consuming centers. The factories in the Lake States, however, have accessible markets for dried pulp, and this is quite a profitable feature of their business.

EFFECT OF BY-PRODUCTS ON NET COST.—The by-products of a beet-sugar factory are very important. The extent to which they can be utilized materially affects net costs and consequently profits. The principal by-products, as already stated, are pulp and molasses. In fact, there is no other by-product worth considering. The circum-

stances affecting the value of these by-products are so different that they are here considered separately. The extent to which pulp and molasses affect the net cost of sugar in the various States is shown in the following table:

TABLE 19.—AVERAGE NET VALUE OF BY-PRODUCTS PER 100 POUNDS OF SUGAR PRODUCED, BY STATES, FOR 5 YEARS ENDING 1913–14.

State.	Pulp.	Molasses.	Total.
California	$0.0623	$0.0479	$0.1102
Colorado	.0543	.1097	.1640
Wisconsin	.1355	.2143	.3498
Michigan	.1939	.1558	.3497
Ohio	.2487	.1701	.4188
Montana-Nebraska	.0612	.0745	.1357
Utah-Idaho	.0461	.0706	.1167
Other States	.0795	.1781	.2576
Average, United States	.0904	.1025	.1929

From the foregoing table it is seen that the average net value of by-products per 100 pounds of sugar for the United States during the 5 years ending with 1913–14 was more than 19 cents. The highest net value was nearly 42 cents in Ohio while the lowest was 11 cents in California. The net value of by-products in the three Lake States averaged more than 35 cents per 100 pounds of sugar produced, whereas the average in the States from Colorado west was very much less than one-half as much. The reason for this difference in the value of by-products will appear in the discussion immediately following.

Pulp.—Some factories realize much more for pulp than others. This is not because they produce relatively more pulp than others but it is due to conditions in the region where the factories are located. This product is used mainly for feeding stock. If other feeds are plentiful and cheap in the vicinity of the factory, pulp brings a correspondingly lower price unless a market can be found in other localities. There are ample markets to take all the pulp made, but they are sometimes so far from factories, particularly those in the West, that high freight rates prohibit its profitable shipment.

From the foregoing table it is seen that the value of pulp per 100 pounds of sugar produced is very much higher in the Lake States than elsewhere. In those States the value ranges from about 14 cents in Wisconsin to nearly 25 cents in Ohio. Pulp when dried yields a better return to the factory than when green. This is due mainly to the fact that dried pulp can be kept and put upon the market gradually as the demand seems to assure the best price, whereas green pulp can not be kept indefinitely and can not be

shipped any considerable distance. To some extent the difference in the value of dried and green pulp is that the former is suitable for a greater variety of purposes than the latter. For instance, the green article is not considered a satisfactory feed for dairy cattle, but is useful mainly for fattening purposes.

Molasses.—The value of molasses as a by-product depends mainly upon the same conditions that affect the value of pulp—that is, the demand for feed for stock. Like pulp, it is a valuable food for stock; but, unlike pulp, it can be otherwise utilized. Many factories put their molasses through a process that results in the extraction of a considerable quantity of sugar. When this process is employed the quantity of molasses left as a by-product is very much reduced, but this is compensated for by the additional quantity of sugar extracted from the molasses. If the value of molasses is considered greater than the value of the extra sugar that can be extracted from it, the factory would not go to the expense of extracting the sugar. Whether all the molasses produced is sold, or whether it is run through the factory for the purpose of extracting more sugar, depends upon the relative prices of sugar and molasses. In cases where the sugar is extracted from the molasses the credit for this item is much less than in factories which dispose of the entire molasses output.

It will be seen from the foregoing table that, taking the country as a whole, the average value of molasses per 100 pounds of sugar slightly exceeds the average value of pulp. As in the case of pulp, the credits from molasses are highest in the Lake States. The chief reason for this difference is that the proportion of molasses put through the process for extracting additional sugar is much greater in the West than in the Lake States. This difference in the treatment of molasses is reflected in the gross factory cost of sugar. The reason for the selling of the greater proportion of the molasses as such in the Lake States than elsewhere is due to a better market. There is a greater demand for molasses as a stock food and for the production of alcohol in the Lake States than in the West.

UNUSUALLY HIGH COSTS FOR SOME FACTORIES IN 1911–12.—About 25 of the 64 factories shown in Table 14 had costs very much higher in 1911–12 than in any other year under consideration. Most of the factories having these high costs are located in the Lake States. During that season these companies incurred heavy losses on their beets due to unfavorable weather conditions. This is indicated by the unusually high cost of beets for those factories in that year. One of these factories lost more than a third of a million dollars on beets during that season. The beets were purchased and paid for, but spoiled before they could be converted into sugar.

The effect of this abnormal year upon the average cost of production in Michigan, Ohio, and Wisconsin for the five years is especially

striking. This is brought out in Table 20 below. This table shows the average net cost in these States for the 5-year period ending with 1913–14, the average cost for 1911–12, and the average for four years omitting the abnormal year. There is also shown the excess of the cost in 1911–12 over the average for four years.

TABLE 20.—COMPARISON OF AVERAGE NET COST, NOT INCLUDING DEPRECIATION, OF PRODUCING 100 POUNDS OF SUGAR IN MICHIGAN, OHIO, AND WISCONSIN FOR THE 5 YEARS ENDING WITH 1913-14, THE YEAR 1911-12, AND FOR 4 YEARS EXCLUDING 1911-12.

State.	Average net cost for 5 years.	Average net cost for 4 years.	Average net cost for 1911-12.	Excess of 1911-12 over average for 4 years.	Excess cost of beets in 1911-12 over average for 4 years.
Michigan	$3.9334	$3.6203	$5.1123	$1.4920	$1.2741
Ohio	4.3030	3.9629	5.9823	2.0194	1.9142
Wisconsin	4.4860	4.0700	5.8239	1.7539	1.6475
United States	3.5041	3.4299	3.8149	.3850	.3010

Excluding 1911–12 from the five-year period, the average net cost, not including depreciation for the other four years, was below the average net cost for 1911–12 $1.49, $2.02, and $1.75, respectively, for Michigan, Ohio, and Wisconsin. The average for the four years was 38½ cents per 100 pounds less than the average for 1911–12. The last column of the above table shows the excess of the cost of beets per 100 pounds of sugar in 1911–12 over the average for four years. It is seen that the excess cost in these States during this abnormal year was due almost entirely to the extraordinarily high cost of beets. The factories in these States contracted for their beets as usual. There was a very large crop, accompanied by exceptionally unfavorable weather during the operating season. Many of the beets spoiled, and some factories, finding they would be unable to work their beets, permitted them to remain in the field. However, they had contracted for the entire yield and had to pay for them, even though they did not use them. All the expense for beets was properly charged against sugar whether the beets were worked or not.

The abnormally high cost of production in 1911–12 is reflected in the 5-year averages. This is clearly indicated by a comparison of the averages in these States for the 5-year period and for the 4 years excluding 1911–12. The difference in the averages was from 30 to 40 cents per 100 pounds. Of course, the high costs in these three States are reflected in the average for the United States. Thus the costs for the whole United States for the 4 years was about 7 cents per 100 pounds less than the average for the 5 years, including the abnormal year. This difference is also seen to have been due to a difference in the cost of beets per 100 pounds of sugar.

Section 7. Average costs by groups of factories.

Grouping the 64 factories covered by Table 14 according to their net cost of production brings out the percentage of the total production in the United States during the 5 years ending with the campaign of 1913–14 that was produced within certain cost limits. For this purpose 6 groups have been made, 4 of them according to the net cost per 100 pounds, not including depreciation, and 2 of them according to the net cost including depreciation. Table 21 below shows the number of factories included in each group, the percentage of the total production manufactured by each group, the average net cost per 100 pounds, excluding depreciation, the depreciation per 100 pounds, and the average net cost per 100 pounds, including depreciation. There is also shown the total for the 64 factories included in Table 14.

TABLE 21.—AVERAGE NET COST PER 100 POUNDS OF SUGAR, AND THE PERCENTAGE OF THE TOTAL SUGAR PRODUCED DURING THE FIVE YEARS ENDING WITH THE CAMPAIGN OF 1913-14, FOR 64 FACTORIES GROUPED ACCORDING TO THE NET COST OF PRODUCTION.

Groups.	Number of factories.	Per cent of total sugar produced.	Average net cost per 100 pounds not including depreciation.	Depreciation per 100 pounds	Average net cost per 100 pounds including depreciation.
1 Cost not exceeding $3.25, not including depreciation.	15	37	$3.03	$0.20	$3.23
2. Cost over $3.25, but less than $3.50, not including depreciation	11	20	3.37	.23	3.60
3. Cost over $3.50, but less than $4, not including depreciation	17	24	3.69	.27	3.96
4. Cost over $4, not including depreciation	21	15	4.49	.35	4.84
5. Cost over $4, including depreciation	28	22	4.29	.35	4.64
6. Cost less than $4, including depreciation	36	74	3.25	.21	3.46
Total	64	96	3.49	.25	3.74

Particular attention is directed to the fact that the foregoing table includes 96 per cent of all the beet sugar produced in the United States during the 5 years covered by this report. Of the 15 factories included in the first group, 4 had an average cost of less than $3 per 100 pounds, excluding depreciation, and only 3 had an average cost of over $3.20 per 100 pounds. These 15 factories produced 37 per cent of the total sugar produced in the United States. The second group produced 20 per cent of the total production. It is thus seen that 57 per cent of all the sugar produced in the United States was made at a cost of not exceeding $3.50 per 100 pounds, excluding depreciation. The average cost, not including depreciation, for these two groups was slightly above $3.15 per 100 pounds.

A particularly interesting fact brought out in the above table is the comparatively small percentage of the total sugar produced by the 21 factories having a cost of over $4, not including depreciation. These 21 factories made only 15 per cent of the total sugar produced in the United States.

The 36 factories having a cost of less than $4 per 100 pounds, including depreciation, produced 74 per cent of the total production in the United States at an average cost of $3.25, not including depreciation, and $3.46 including it. The 28 factories having a cost of over $4 per 100 pounds, including depreciation, produced only 22 per cent of the sugar at an average cost of $4.64. It is interesting to note that of the 28 factories having a cost of over $4 per 100 pounds, including depreciation, 10 are in Michigan, 5 in Colorado, 4 in Wisconsin, 3 in Ohio, and one each in Minnesota, Iowa, Kansas, Nebraska, Arizona, and Oregon. The factory operating in Oregon has been removed to Idaho.

By comparing the figures in the table, it will be observed that the groups of factories having the lowest cost, not including depreciation, also have the lowest depreciation per 100 pounds. Group 4, which has the highest cost, has nearly twice as great a charge for depreciation as group 1, which has the lowest cost.

Section 8. Comparative cost of production for all factories, by years.

Details of cost of production by factories, by years, are not shown in this report for reasons already stated (see p. 62), and for the further reason that it was not possible to arrive at a satisfactory basis to compute depreciation for some factories for individual years, though this could be done by companies. It is of some interest, however, to show the cost of producing 100 pounds of sugar, not including depreciation, for all factories by years to compare these results with the average cost for 5 years. Such a comparison is made in the statement below:

Year.	Number of factories operating.	Cost of beets.	Net cost of manufacture, not including depreciation.	Total.
1909-10	59	$2.3432	$0.9368	$3.2800
1910-11	58	2.4215	.9916	3.4131
1911-12	63	2.7671	1.0478	3.8149
1912-13	71	2.5257	1.0231	3.5488
1913-14	69	2.5243	.9039	3.4282
Average for 5 years	74	2.5247	.9794	3.5041
Average for 4 years, omitting 1911	74	2.4661	.9629	3.4290

From the foregoing statement it is seen that the lowest average cost, not including depreciation, was $3.28 in the campaign of 1909–10 and the highest was $3.81 in the campaign of 1911–12. As already stated (see p. 83) the unusually high cost in the latter campaign was due to the fact that in the Lake States a great many beets bought and paid for by the beet-sugar companies spoiled before they could be used. Consequently, the average cost of beets per 100 pounds of sugar in the United States for that year was considerably higher than usual and the net cost of manufacture, partially due to the same cause, was also higher. The average net cost for all factories for the five years, excluding depreciation, was $3.50, while the average for the four years, omitting 1911, was $3.43.

Section 9. Cost of sugar manufactured per ton of beets.

Costs in the beet-sugar business as well as in most other industries are usually determined on the basis of a unit of product. In the case of sugar the basis is 100 pounds. In European countries, however, a ton of beets worked is frequently considered the unit and costs are discussed in that relation. For the technique of sugar manufacture there is considerable interest in the study of costs on this basis. A general statement of the costs of extracting the sugar from a ton of beets has but little real value in a comparative study of costs. If all beets were of the same quality such a comparison in different factories would afford a valuable guide in the determination of factory efficiency. It rarely ever occurs, however, that any two factories have beets of exactly the same quality. The average cost of manufacture per ton of beets, therefore, does not add much, if anything, to the knowledge derived from a study of costs per 100 pounds of sugar produced.

Notwithstanding the foregoing facts, a statement of costs based on a ton of beets sliced is here given as a matter of interest and because it may be of some use to the sugar manufacturer. The cost data of the 64 factories covered by Table 14 have been compiled on the basis of 1 ton of beets sliced and the results are shown in Table 22. The elements of cost are classified as in the cost table based on 100 pounds of sugar, except that depreciation is not considered. The results are usually the average for 5 years, though a few factories operating only 3 or 4 years have been included. The column showing the average number of pounds of sugar extracted from a ton of beets by each factory is inserted in the table. By dividing the average net factory cost per ton of beets by the average extraction, the net cost per 100 pounds of sugar can be found. This result will agree with the net costs shown in Table 14 (see p. 72). Multiplying the depreciation per 100 pounds of sugar shown in Table 14 by the extraction per ton of beets shown in Table 22 will give the amount of depreciation per ton of beets.

TABLE 22.—AVERAGE SUGAR EXTRACTION PER TON OF BEETS AND AVERAGE COST OF THE MANUFACTURE OF SUGAR PER TON OF BEETS SLICED, BY FACTORIES, FOR THE FIVE YEARS, 1909–1913.

Factory No.	Sugar extracted (pounds).	Beets.	Fuel.	Lime rock and lime.	Sugar bags and barrels.	Other supplies.	Maintenance and repairs.	Operating labor.	Administration and office expense.	Insurance and taxes.	Stock in process from last year.	Gross factory cost.	Credits.			Net factory cost, not including depreciation.
													Stock in process and by-products.	Miscellaneous gains or losses (net).[1]	Total.	
1	257	$7.930	$0.487	$0.136	$0.318	$0.133	$0.368	$0.608	$0.542	$0.321	$0.228	$11.071	$0.974	—$0.026	$0.948	$10.123
2	224	7.806	.633	.206	.272	.126	.479	.868	.441	.161	.465	11.457	.997	.154	1.151	10.306
3	198	8.133	.472	.135	.264	.076	.703	.484	.415	.027	.119	10.828	1.120	.055	1.175	9.653
4	205	7.810	.603	.171	.238	.191	.604	1.059	.398	.071	.512	11.657	1.161	.032	1.193	10.464
5	232	7.577	.640	.206	.317	.087	.453	.920	.476	.121	.325	11.122	.994	.134	1.128	9.994
6	222	7.393	.328	.093	.298	.128	.350	.612	.423	.149	.125	9.899	.925	— .072	.853	9.046
7	260	7.373	.440	.126	.311	.094	.326	.931	.323	.154	.....	10.078	.833	— .018	.815	9.263
8	217	7.122	.526	.113	.304	.115	.265	1.141	.356	.103	.....	10.045	.888	— .021	.867	9.178
10	225	7.505	.426	.117	.270	.107	.143	.627	.464	.233	.122	10.014	.854	— .009	.845	9.169
11	213	6.967	.475	.082	.247	.102	.163	.632	.453	.206	.107	9.434	1.070	.010	1.080	8.354
12	229	7.148	.588	.109	.318	.092	.517	.598	.412	.198	.119	10.099	1.140	.017	1.157	8.942
13	232	7.314	.496	.111	.310	.100	.409	.534	.370	.116	.106	9.866	1.157	.061	1.218	8.648
14	260	7.350	.570	.143	.349	.126	.378	.696	.382	.086	.101	10.181	.853	.038	.891	9.290
15	262	7.543	.573	.184	.369	.134	.596	.783	.466	.140	.090	10.878	.701	.009	.710	10.168
16	246	7.618	.579	.126	.339	.177	.558	.852	.446	.080	.152	10.927	.936	— .020	.916	10.011
17	260	7.092	.450	.081	.350	.088	.382	.504	.383	.081	.084	9.495	1.175	.074	1.249	8.246
18	200	8.981	.583	.163	.254	.092	.335	.750	.390	.056	.260	11.864	1.189	.018	1.207	10.657
19	231	7.902	.524	.133	.259	.085	.400	.775	.296	.160	.167	10.701	.701	.....	.701	10.000
20	225	7.806	.480	.142	.291	.138	.453	.647	.543	.164	.213	10.877	.716	.018	.734	10.143
21	242	7.405	.529	.056	.334	.071	.407	.764	.195	.118	.....	9.879	.893	.012	.905	8.974

23	231	7.332	.845	.175	.316	.157	.366	.677	.462	.136	.256	10.722	.959	— .056	.903	9.819
24	206	7.547	.938	.114	.271	.157	.547	.981	.406	.024	.127	11.112	.809	— .123	.686	10.426
25	207	7.361	.403	.065	.285	.169	.595	.778	.440	.180	.146	10.422	.724	— .070	.654	9.768
26	195	7.554	.364	.093	.272	.093	.204	.753	.440	.065	.062	9.900	1.344	— .104	1.240	8.660
29	220	7.148	.855	.146	.236	.336	.854	1.156	1.057	.218	.965	12.971	1.708	.069	1.777	11.194
30	300	7.049	.412	.131	.363	.142	.517	.811	.571	.191	.112	10.299	.430	.009	.439	9.860
31	281	6.425	.824	.384	.307	.209	1.087	.791	.798	.223	.159	11.207	.291	.006	.297	10.910
34	285	6.939	.476	.216	.323	.164	.544	.796	.602	.176	.178	10.414	.274	— .017	.257	10.157
35	255	6.484	.604	.164	.291	.120	.289	.728	.529	.068	.077	9.354	.385	— .032	.353	9.001
36	233	6.251	.397	.150	.262	.094	.383	.502	.579	.158	.207	8.983	.770	— .001	.769	8.214
37	243	6.326	.365	.155	.277	.100	.330	.569	.531	.140	.083	8.876	.686	— .003	.683	8.193
38	282	6.497	.366	.234	.325	.126	.369	.604	.505	.127	.300	9.453	.467	— .015	.452	9.001
39	238	6.223	.385	.140	.270	.114	.363	.478	.547	.151	.070	8.741	.670	.005	.675	8.066
40	247	6.463	.382	.142	.280	.104	.391	.560	.636	.151	.085	9.194	.645	.021	.666	8.528
41	284	6.565	.356	.229	.328	.131	.368	.651	.530	.129	.335	9.622	.456	— .016	.440	9.182
42	273	6.397	.456	.243	.306	.156	.492	.721	.502	.134	.385	9.792	.526	— .006	.520	9.272
43	275	6.400	.571	.230	.310	.110	.451	.732	.608	.151	.335	9.898	.498	.026	.524	9.374
44	244	6.295	.348	.156	.275	.122	.358	.549	.566	.138	.134	8.941	.707	.030	.737	8.204
45	254	6.320	.624	.322	.301	.141	.736	.945	.874	.331	.385	10.979	.502	— .057	.445	10.534
46	253	6.664	.458	.281	.313	.115	.549	.722	.733	.189	.134	10.158	.303	.001	.304	9.854
47	260	6.001	.634	.221	.294	.287	.532	.868	1.046	.314	.442	10.639	.874	— .002	.872	9.767
48	210	6.055	1.287	.307	.241	.215	.197	1.438	1.101	.240	.308	11.389	.893	— .687	.206	11.183
50	233	5.724	.694	.156	.252	.208	1.098	1.335	.698	.453	.793	11.411	1.228	— .429	.799	10.612
51	251	5.324	.480	.075	.294	.103	.506	.710	.428	.141	.185	8.246	.476	— .014	.462	7.784
52	255	5.291	.469	.096	.295	.110	.566	.718	.389	.158	.205	8.297	.460	.037	.497	7.800
53	236	5.113	.502	.078	.274	.114	.492	.684	.343	.132	.216	7.948	.539	.056	.595	7.353
54	267	6.027	.801	.100	.313	.095	.737	.719	.497	.231	.270	9.790	.559	.051	.610	9.180
55	264	5.510	.564	.105	.295	.089	.371	.614	.523	.226	.259	8.556	.498	— .060	.438	8.118
56	273	5.890	.696	.100	.306	.097	.533	.597	.485	.216	.362	9.282	.621	.023	.644	8.638
57	260	5.584	.612	.128	.288	.094	.690	.672	.418	.191	.036	8.713	.265	.072	.337	8.376

[1] A minus (—) sign in this column indicates a net loss from miscellaneous sources, and it is deducted from stock in process, etc., to find the total net credit.

TABLE 22.—AVERAGE SUGAR EXTRACTION PER TON OF BEETS AND AVERAGE COST OF THE MANUFACTURE OF SUGAR PER TON OF BEETS SLICED, BY FACTORIES, FOR THE FIVE YEARS, 1909-1913—Continued.

Factory No.	Sugar extracted (pounds).	Beets.	Fuel.	Lime rock and lime.	Sugar bags and barrels.	Other supplies.	Maintenance and repairs.	Operating labor.	Administration and office expense.	Insurance and taxes.	Stock in process from last year.	Gross factory cost.	Credits.			Net factory cost, not including depreciation.
													Stock in process and by-products.	Miscellaneous gains or losses (net).[1]	Total.	
60	259	$5.347	$0.416	$0.086	$0.301	$0.102	$0.345	$0.513	$0.502	$0.224	$0.058	$7.894	$0.530	—$0.029	$0.501	$7.393
61	274	5.753	.807	.146	.311	.119	.509	.707	.529	.253	.126	9.260	.317	.010	.327	8.933
62	223	6.731	.402	.161	.274	.180	.425	.789	.485	.108	.072	9.627	.548	.027	.575	9.052
63	301	5.382	.564	.193	.369	.097	.438	.623	.612	.264	.664	9.206	1.014	— .047	.967	8.239
64	336	5.501	.444	.382	.378	.129	.972	.575	.699	.192	.087	9.359	.230	.017	.247	9.112
65	262	6.573	.744	.252	.324	.172	.128	.799	.635	.124	.182	9.933	1.027	.093	1.120	8.813
66	267	6.141	.628	.271	.316	.188	.668	.898	.859	.241	.945	11.155	1.338	.017	1.355	9.800
67	259	7.138	.803	.216	.462	.196	.185	1.407	.572	.188	.124	11.291	1.852	.019	1.871	9.420
68	305	6.342	.656	.219	.346	.355	1.045	1.036	.710	.245	.053	11.007	.386	.166	.552	10.455
69	346	7.188	.483	.255	.387	.295	.522	.699	.512	.122	.039	10.502	.138	.056	.194	10.308
70	289	6.916	.598	.264	.366	.128	.384	.561	.653	.097	.069	10.036	.689	— .006	.683	9.353
71	300	6.434	.636	.197	.333	.130	.490	1.157	.314	.147	.124	9.962	.627	.074	.701	9.261
73	293	5.841	.718	.279	.375	.210	.939	1.374	.533	.101	.089	10.459	.238	— .100	.138	10.321
74	248	7.658	.809	.138	.222	.226	.962	1.382	1.612	.594	.451	14.054	1.355	— .400	.955	13.099

[1] A minus (—) sign in this column indicates a net loss from miscellaneous sources, and it is deducted from stock in process, etc., to find the total net credit.

The results shown in the foregoing table run exactly parallel with those already shown in Table 14 (see p. 72), and the discussion of that table will apply here. It is of some interest, however, to consider a few significant facts brought out in the above table.

The average extraction of sugar per ton of beets ranges from about 200 to more than 300 pounds. The average for the 64 factories operating during the five-year period covered was 265 pounds. It will be observed that there is no fixed relation between the quantity of sugar extracted and the various elements of cost per ton of beets. The lowest cost for operating labor was 48 cents in factories numbered 3 and 39, with a sugar extraction per ton of beets of 198 pounds and 238 pounds, respectively. The highest cost of labor was $1.43 in factory No. 48, which had an extraction of 210 pounds or 28 pounds less than factory No. 39. Factory No. 69, with an extraction of 346 pounds, had a labor cost of approximately 70 cents per ton of beets, while factory No. 71 with 46 pounds less extraction had a labor cost of nearly $1.16 per ton of beets. Similar comparisons can be made with other elements of cost.

Another notable fact brought out in the table is that among the factories having the lowest sugar extraction is often found the highest cost of beets. The expenditures for beets shown in the table are the actual cost per ton laid down at the factory. Only 2 factories of the 64 paid as much as $8 per ton for beets, and with one exception these 2 factories had the lowest extraction. The extremely high cost of beets in these two instances was not due to a high price paid the farmer for beets but to extraordinarily high expenses in procuring beets and having them delivered at the factory, and to losses from the spoiling of beets.

CHAPTER IV.

DISTRIBUTION OF SUGAR.

Section 1. Introduction.

The product of the beet-sugar factories is all granulated sugar ready for table use. The factories located in the West pack their product in bags containing 100 pounds each. Some of the sugar produced in the eastern factories is packed in this manner, but most of it is packed in barrels which contain about 340 pounds each. Some is also sold in bales, a bale containing four 25-pound bags packed in this manner for the convenience of the trade. Practically all of the product is sold through jobbers, a small quantity being sold directly to the beet growers for their own use. One or two companies also dispose of their product to near-by cane refineries.

Section 2. Where beet sugar is consumed.

Data showing the quantity of sugar sold in each State by factories were secured from the majority of the companies. In some cases this information was not available, and in others, due to the amount of work involved, it was not obtained. Such information was secured from 29 of the 37 companies which in 1913 sold 1,006,884,238 pounds. The great bulk of the total sales is thus accounted for, as the sales of the largest companies are included. In 1912 information was secured from only 24 companies, which sold 1,039,789,058 pounds. The following table shows the quantity and per cent sold in each State by these companies for these two years:

TABLE 23.—BEET-SUGAR SOLD BY 24 COMPANIES IN THE VARIOUS STATES FOR THE YEAR 1912 AND 29 COMPANIES IN 1913.

State.	1912		1913	
	Pounds.	Per cent.	Pounds.	Per cent.
Alabama	1,855,500	.18	528,500	.05
Arizona	6,671,000	.64	9,739,400	.97
Arkansas	14,670,900	1.41	17,098,294	1.70
California [1]	80,788,000	7.77	93,254,700	9.26
Colorado	39,680,300	3.82	24,656,400	2.45
Connecticut	440,936	.04	.....	.....
Delaware	161,741	.02	.....	.....
District of Columbia	2,337,434	.22	649,947	.06

[1] Includes the sugar sold by the Alameda Sugar Co. in Oregon and Washington.

TABLE 23.—BEET SUGAR SOLD BY 24 COMPANIES IN THE VARIOUS STATES FOR THE YEAR 1912 AND 29 COMPANIES IN 1913—Continued.

State.	1912		1913	
	Pounds.	Per cent.	Pounds.	Per cent.
Florida	900,600	.09	239,500	.02
Georgia	5,024,700	.48	2,648,700	.26
Idaho	5,395,900	.52	6,493,800	.64
Illinois	121,505,253	11.69	98,555,963	9.79
Indiana	17,832,464	1.72	17,289,666	1.72
Iowa	86,129,227	8.28	75,532,098	7.50
Kansas	45,977,800	4.42	50,110,777	4.98
Kentucky	10,903,317	1.05	12,147,848	1.21
Louisiana	893,500	.09	701,000	.07
Maryland	11,033,973	1.06	3,112,454	.31
Massachusetts	253,183	.02	.....	.....
Michigan	24,643,246	2.37	50,481,976	5.01
Minnesota	82,306,186	7.92	89,864,364	8.92
Mississippi	1,553,400	.15	501,200	.05
Missouri	95,132,839	9.15	96,535,911	9.59
Montana	23,651,600	2.27	11,079,700	1.10
Nebraska	56,324,791	5.42	56,466,300	5.61
Nevada	350,900	.03	510,000	.05
New Jersey	2,215,215	.21	65,000	.01
New Mexico	6,906,400	.66	6,668,900	.66
New York	23,618,336	2.27	13,675,932	1.36
North Carolina	1,831,000	.18	365,900	.04
North Dakota [1]	21,147,972	2.03	7,936,549	.79
Ohio	31,116,651	2.99	57,006,671	5.66
Oklahoma	38,125,700	3.67	51,904,000	5.15
Oregon	5,591,800	.54	4,039,300	.40
Pennsylvania	36,682,927	3.53	19,210,482	1.91
Rhode Island	300,239	.03	.....	.....
South Carolina	1,743,800	.17	300,000	.03
South Dakota	20,485,573	1.97	17,377,913	1.73
Tennessee	10,971,163	1.06	6,128,850	.61
Texas	36,321,900	3.49	32,427,200	3.22
Utah	22,185,100	2.13	24,671,500	2.45
Vermont	444,449	.04	113,000	.01
Virginia	8,303,074	.80	5,526,093	.55
Washington	8,359,000	.80	6,502,300	.65
West Virginia	3,426,046	.33	2,063,284	.20
Wisconsin	19,843,923	1.91	29,998,166	2.97
Wyoming	3,750,100	.36	2,704,700	.28
Total	1,039,789,058	100.00	1,006,884,238	100.00

[1] Includes the sugar sold by the Holly Sugar Co. in South Dakota.

From the above table it is seen that beet sugar is sold in nearly every State in the Union. California, Illinois, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Oklahoma received the largest quantities of beet sugar, 66 per cent of the amount shown in the table, for 1913, being sold in these States. It is probable that a larger proportion of the product was sold in California

than is shown above, as the table does not include the product of a large company which sold its entire product to a cane refinery which in turn disposes of a large part of its product in this State. In 1912 more than 50,000,000 pounds was sold in each of the States of California, Illinois, Iowa, Minnesota, Missouri, and Nebraska, 50 per cent of the quantity shown in the table being sold in these six States. No doubt more than 50,000,000 pounds was sold also in Michigan, as the table does not include the product of the Michigan Sugar Co. Small companies can usually dispose of their product either locally or in near-by States, but the largest companies must of necessity find markets in various States. The companies in Utah, Idaho, and Colorado are forced to invade the eastern markets, since their production far exceeds the home demand and because California produces large quantities of both beet and cane sugar and largely supplies the Pacific coast markets. The Great Western Sugar Co. in 1913, for example, sold sugar in 33 different States. Of course the bulk of their product was sold in the central Western States, but small quantities were sold even as far east as Vermont, New York, New Jersey, and Virginia. Only small quantities are sold in the Southern States for the reason that the Louisiana cane refineries have the advantage of lower freight rates.

Section 3. Cost of distribution.

In this discussion all expense incident to selling except a small amount for administration and for insurance of sugar in warehouses at the factories has been charged to cost of distribution. As already explained (see p. 61) the two latter items could not be separated from other administrative expense and from insurance on plant and equipment and therefore they have been charged against cost of production. Since each company sells the product of all its factories as one unit only averages for companies can be shown. The average brokerage commission and freight per 100 pounds are shown separately, and the other items of cost, such as insurance, storage allowances, and cash discounts, are included under the head of other expense. The average price received per 100 pounds, the average net price at the factory, and the principal items making up the selling expense are shown in Table 24 below:

TABLE 24.—GROSS RECEIPTS PER 100 POUNDS OF BEET SUGAR, SELLING EXPENSE AND NET PRICE AT FACTORY PER 100 POUNDS, BY COMPANIES, FOR THE YEARS 1909–10 TO 1913–14, INCLUSIVE.

1909–10.

Company.	Gross receipts.	Selling expense.				Net price at factory.
		Brokerage and commission.	Freight.	Other expense.	Total selling expense.	
1	$5.0866	$0.0309	$0.4424	$0.0818	$0.5551	$4.5315
2	4.9702	.0589	.1410	.0543	.2542	4.7160
3	5.0431	.0299	.2946	.0599	.3844	4.6587
4	5.0587	.0300	.0919	.0790	.2009	4.8578
5	4.9632	.0207	.0872	.0582	.1661	4.7971
6	4.7655	.0846	.1249	.0476	.2571	4.5084
7						
8	5.7104	.0808	.6784	.2334	.9926	4.7178
9	5.0393	.0288	.5576	.0432	.6296	4.4097
10	4.9360	.0173	.3542	.0585	.4300	4.5060
11	4.9959	.0959	.1437	.0549	.2945	4.7014
12						
13	4.8787		.0062	.0865	.0927	4.7860
14						
15	4.8393	.0289		.0989	.1278	4.7115
16	5.0155	.0281	.1337	.1208	.2826	4.7329
17	5.1906	.0417	.4522	.0677	.5616	4.6290
18	5.0032	.0319	.1361	.0876	.2556	4.7476
19	5.0864	.0335	.2285	.0814	.3434	4.7430
20	4.9985	.0324	.1418	.0553	.2295	4.7690
21						
22	5.8809	.1342	.4273	.0253	.5868	5.2941
23						
24	5.1752	.0360	.4421	.0552	.5333	4.6419
25	4.9740	.0283	.0722	.1397	.2402	4.7338
26	5.2217	.0330	.4153	.1002	.5485	4.6732
27	5.0550	.0260	.0961	.0816	.2037	4.8513
28	4.9924	.0801	.1202	.1057	.3060	4.6864
29	5.1590	.0302	.2771	.0362	.3435	4.8155
30	4.9344	.0281	.0677	.0534	.1492	4.7852
31	5.0171	.0361	.0867	.0681	.1909	4.8262
32						
33	4.9652	.0245	.1317	.0521	.2083	4.7569
34						
35	5.2221	.0298	.0683	.0050	.1031	5.1190
36	4.9134	.0321	.0960	.0980	.2261	4.6873
37	5.3229	.0311	.4130	.0841	.5282	4.7947

TABLE 24.—GROSS RECEIPTS PER 100 POUNDS OF BEET SUGAR, SELLING EXPENSE AND NET PRICE AT FACTORY PER 100 POUNDS, BY COMPANIES, FOR THE YEARS 1909–10 TO 1913–14, INCLUSIVE—Continued.

1910–11.

Company.	Gross receipts.	Selling expense.				Net price at factory.
		Brokerage and commission.	Freight.	Other expense.	Total selling expense.	
1	$5.0609	$0.0301	$0.4603	$0.0881	$0.5785	$4.4824
2	4.6798	.0571	.1442	.0989	.3002	4.3796
3	5.1366	.0310	.2836	.0657	.3803	4.7563
4	4.7463	.0244	.1333	.0736	.2313	4.5150
5	4.9414	.0268	.0982	.0614	.1964	4.7550
6	4.3709	.0265	.1241	.0391	.1897	4.1812
7						
8	5.2407	.0201	.2036	.1286	.3523	4.8884
9	4.8116	.0310	.0922	.1118	.2350	4.5766
10	5.1102	.0074	.1791	.0639	.2504	4.8598
11	4.6738	.0889	.1482	.0741	.3112	4.3626
12						
13	4.6145	.....	.0128	[1].0009	.0119	4.6026
14						
15	5.0019	.0474	.....	.1913	.2387	4.7632
16	4.6174	.0333	.1283	.0321	.1937	4.4237
17	5.2523	.0377	.4553	.0694	.5624	4.6899
18	4.6453	.0310	.1394	.0917	.2621	4.3832
19	5.1818	.0337	.2793	.1013	.4143	4.7675
20	4.6538	.0491	.1449	.0822	.2762	4.3776
21						
22	5.9262	.1342	.4273	.0253	.5868	5.3394
23						
24	5.1788	.0359	.4496	.0509	.5364	4.6424
25	4.6891	.0309	.0734	.1971	.3014	4.3877
26	5.2713	.0338	.4021	.1005	.5364	4.7349
27	4.7763	.0284	.0865	.0946	.2095	4.5668
28	4.6506	.0800	.1207	.0967	.2974	4.3532
29	5.1411	.0299	.3525	.0509	.4333	4.7078
30	5.0409	.0535	.0916	.1339	.2790	4.7619
31	4.7623	.0351	.1075	.0693	.2119	4.5504
32						
33	4.7340	.0310	.0910	.0632	.1852	4.5488
34						
35	5.0634	.0344	.2709	.0094	.3147	4.7487
36	4.7182	.0273	.0841	.0938	.2052	4.5130
37	5.3339	.0367	.4621	.1120	.6108	4.7231

[1] Credit from insurance fund.

TABLE 24.—GROSS RECEIPTS PER 100 POUNDS OF BEET SUGAR, SELLING EXPENSE AND NET PRICE AT FACTORY PER 100 POUNDS, BY COMPANIES, FOR THE YEARS 1909–10 TO 1913–14, INCLUSIVE—Continued.

1911–12.

Company.	Gross receipts.	Selling expense.				Net price at factory.
		Brokerage and commission.	Freight.	Other expense.	Total selling expense.	
1	$5.3859	$0.0298	$0.4471	$0.1202	$0.5971	$4.7888
2	5.6275	.0483	.1862	.1065	.3410	5.2865
3	5.5033	.0305	.2884	.1131	.4320	5.0713
4	5.6959	.0255	.1454	.1139	.2848	5.4111
5	5.5840	.0252	.0944	.0904	.2100	5.3740
6	5.6246	.0411	.1386	.1160	.2957	5.3289
7						
8	5.4358	.0710	.8121	.2584	1.1415	4.2943
9	4.8627	.0293	.1067	.1267	.1727	4.6900
10	4.9181	.0152	.2889	.1153	.4194	4.4987
11	5.7955	.1104	.1564	.1244	.3912	5.4043
12						
13	5.1211	.0021	.0436	.1130	.1587	4.9624
14	5.6369	.0320	.3904	.0679	.4903	5.1466
15	4.6912	.0126	.0266	.0910	.1302	4.5610
16	5.7569	.0565	.1063	.1851	.3479	5.4090
17	5.5045	.0376	.5612	.1186	.7174	4.7871
18	5.7338	.0322	.1440	.1408	.3170	5.4168
19	5.4817	.0301	.2496	.1022	.3819	5.0998
20	5.8003	.0534	.1712	.1198	.3444	5.4559
21	6.7545				.9971	5.7574
22	5.6984	.0381	.3694	.1958	.6033	5.0951
23						
24	5.3815	.0352	.4433	.1085	.5870	4.7945
25	5.6150	.0308	.1363	.1751	.3422	5.2728
26	5.4163	.0314	.3919	.0928	.5161	4.9002
27	5.7402	.0325	.0806	.1480	.2611	5.4791
28	5.8096	.0888	.1893	.1378	.4159	5.3937
29	5.5741	.0313	.4043	.0997	.5353	5.0388
30	4.9979	.0268	.1702	.1324	.3294	4.6685
31	5.8611	.0303	.0900	.1368	.2571	5.6040
32						
33	5.2869	.0854	.1257	.1073	.2684	5.0185
34						
35	4.5138	.0600	.0569	.0125	.1294	4.3844
36	5.6542	.0242	.0975	.1711	.2928	5.3614
37	5.9035	.0375	.4782	.1782	.6939	5.2096

TABLE 24.—GROSS RECEIPTS PER 100 POUNDS OF BEET SUGAR, SELLING EXPENSE AND NET PRICE AT FACTORY PER 100 POUNDS, BY COMPANIES, FOR THE YEARS 1909–10 TO 1913–14, INCLUSIVE—Continued.

1912–13.

Company.	Gross receipts.	Selling expense.				Net price at factory.
		Brokerage and commission.	Freight.	Other expense.	Total selling expense.	
1	$4.8953	$0.0299	$0.4286	$0.1526	$0.6111	$4.2842
2	4.7757	.0899	.1776	.1171	.3846	4.3911
3	4.9695	.0304	.3509	.1410	.5223	4.4472
4	4.7306	.0351	.1739	.1129	.3219	4.4087
5	5.0347	.0291	.0918	.1265	.2474	4.7873
6	4.5393	.0537	.1016	.0895	.2448	4.2945
7	4.6682	.0300	.1185	.1093	.2578	4.4104
8	5.1925	.0252	.1958	.1280	.3490	4.8435
9	4.9923	.0504	.7561	.1331	.9396	4.0527
10	5.1708	.0140	.2684	.1065	.3889	4.7819
11	4.6497	.0897	.1374	.1120	.3391	4.3106
12	4.4901	.0435	.1202	.0446	.2083	4.2818
13	4.5460	.0001	.0114	.1039	.1154	4.4306
14	5.1434	.0403	.3940	.1528	.5871	4.5563
15	5.1531	.0767	.....	.3371	.4138	4.7393
16	4.7784	.0291	1186	.2854	.4331	4.3453
17	5.2337	.0356	.4287	.1353	.5996	4.6341
18	4.6225	.0435	.1317	.1159	.2911	4.3314
19	5.3650	.0278	.3935	.1496	.5709	4.7941
20	4.6582	.0521	.1726	.1187	.3434	4.3148
21	5.7543	.....	.....	.....	.5181	5.2362
22	5.9856	.0358	.5049	.1989	.7396	5.2460
23	4.7063	.0943	.1175	.1014	.3132	4.3931
24	5.2835	.0363	.4607	.1290	.6260	4.6575
25	4.7331	.0291	.0926	.2133	.3350	4.3981
26	5.3196	.0350	.4467	.1349	.6166	4.7030
27	4.8257	.0081	.0827	.2157	.3065	4.5192
28	4.7148	.0825	.1737	.1127	.3689	4.3459
29	4.8241	.0300	.4996	.1159	.6455	4.1786
30	5.1864	.0333	.2278	.0929	.3540	4.8324
31	4.7623	.0262	.1129	.1827	.3218	4.4405
32	4.9411	.....	.2241	.0467	.2708	4.6703
33	4.7859	.0287	.1052	.1281	.2620	4.5239
34	4.9747	.0247	.4919	.2805	.7971	4.1776
35	4.4670	.0810	.0673	.0099	.1582	4.3088
36	4.7501	.0270	.1019	.3097	.4386	4.3115
37	5.1858	.0292	.4924	.1821	.7037	4.4821

TABLE 24.—GROSS RECEIPTS PER 100 POUNDS OF BEET SUGAR, SELLING EXPENSE AND NET PRICE AT FACTORY PER 100 POUNDS, BY COMPANIES, FOR THE YEARS 1909–10 TO 1913–14, INCLUSIVE—Continued.

1913–14.

Company.	Gross receipts.	Selling expense.				Net price at factory.
		Brokerage and commission.	Freight.	Other expense.	Total selling expense.	
1	$4.4321	$0.0299	$0.4321	$0.1345	$0.5965	$3.8356
2	4.2492	.0798	.1842	.1309	.3949	3.8543
3	4.4366	.0335	.3077	.1335	.4747	3.9619
4	4.3212	.0295	.1258	.1017	.2565	4.0647
5	4.4089	.0295	.1087	.1214	.2596	4.1493
6	4.1616	.0256	.1222	.0768	.2246	3.9370
7	4.0744	.0800	.1248	.1204	.3252	3.7492
8	4.6257	.0387	.1812	.1834	.4033	4.2224
9	4.2163	.0149	.1342	.1747	.3238	3.8925
10	4.3180	.0141	.2565	.0939	.3645	3.9535
11	4.2751	.0822	.1444	.1647	.3913	3.8838
12						
13	3.9568	.0039	.0198	.0810	.1047	3.8521
14	4.5003	.0390	.2688	.1399	.4477	4.0526
15	4.4057	.0098	.1433	.0648	.2179	4.1878
16	4.2560	.0331	.1061	.1754	.3146	3.9414
17	4.4180	.0371	.4162	.1101	.5634	3.8546
18	4.1788	.0267	.1382	.1107	.2756	3.9032
19	4.5708	.0327	.1895	.1303	.3525	4.2183
20	4.1273	.0558	.1475	.1056	.3089	3.8184
21	5.1551	.0251	.3259	.1351	.4861	4.6690
22	5.3347	.0497	.3865	.1999	.6361	4.6986
23	4.3975	.0861	.1628	.1590	.4079	3.9896
24	4.5087	.0367	.4512	.1194	.6073	3.9014
25	4.5230	.0431	.0728	.1645	.2804	4.2426
26	4.5617	.0345	.3842	.1578	.5765	3.9852
27	4.2642	.0375	.1205	.1812	.3392	3.9250
28	4.2314	.0952	.1763	.1261	.3976	3.8338
29	4.4341	.0408	.4160	.1017	.5585	3.8756
30	4.4572	.0284	.1396	.1890	.3570	4.1002
31	4.3733	.0094	.0764	.1029	.1887	4.1846
32	4.4454	.....	.1517	.0278	.1795	4.2659
33	4.2594	.0308	.0872	.1243	.2423	4.0171
34	4.5864	.0274	.3981	.2452	.6707	3.9157
35	4.6498	.0913	.0888	.0103	.1904	4.4594
36	4.7786	.0404	.0911	.1609	.2924	4.4862
37	4.5795	.0350	.3736	.2052	.6138	3.9657

In the foregoing table it is seen that the cost of selling in 1913–14 ranged from $0.1047 in company No. 13 to $0.6707 per 100 pounds in company No. 34. The average for all companies was $0.4542. The average for all companies in 1909–10, was $0.3865; in 1910–11, $0.3782; in 1911–12, $0.4281; and in 1912–13, $0.4731. The differences in selling expense for the various companies are due largely to the differences in the amount of freight paid.

FREIGHT CHARGES.—The freight on sugar, which is the largest item of selling expense, is usually prepaid by the company. Freight is also paid on the containers, the weight of a bag being considered as one pound and that of a barrel as 16 pounds. Naturally, the average freight per 100 pounds of sugar is higher for large companies, since the larger proportion of their product is sold in more distant markets and consequently on higher freight rates. Also, companies in the East enjoy some advantage over companies whose factories are located in the West, due to their nearness to the great consuming centers. In 1913–14 the highest average freight charge for any eastern company was $0.1842 per bag. The average for the four largest western companies was $0.3672 per bag. The highest average freight in this year was $0.4512 for company No. 24 and the lowest was $0.0198 for company No. 13. The latter company and company No. 35, however, dispose of most of their product on an f. o. b. factory basis. For this reason selling costs are not strictly comparable with those of other companies. Six companies in all had an average freight cost of less than 10 cents per bag, while the cost exceeded 40 cents per bag in only four cases.

Usually the average freight in one year does not differ materially from that paid in other years. Apparently such differences are chiefly due to variations in points to which sugar is shipped. The wide differences in 1909–10 and 1912–13 as compared with the other years for company No. 9 can not be explained unless the amounts for these two years include some freight paid in other years. In 1911 a larger per cent of the product was sold outside the State than in 1912, and yet only about $2,700 freight was paid as compared with $69,000 in the latter year on a slightly larger amount. It will also be noticed that for company No. 8 the average freight in 1909 and 1911 was much higher than for other years. Some sugar was returned to this company as being off color which necessitated the paying of the freight three times, although it is not known what per cent of the total amount sold is affected thereby. The freight cost is shown for company No. 21 for only one year as the detailed cost of selling was not secured for other years.

OTHER EXPENSES.—The average brokerage paid is about 3 cents per 100 pounds. The usual charge paid brokers is 3 cents per bag, 5

cents per bale, or 10 cents per barrel. Companies Nos. 2, 6, 7, 11, 23, and 28 paid an additional 5 per cent since the broker in these cases assumed the responsibility to the customer and in some instances advanced money to the company before the sugar was sold. Company No. 32 disposed of its product locally and paid no brokerage, and company No. 13 paid no brokerage, all its sugar being taken by one concern. The cost of selling for company No. 22 in 1909 was charged in the accounts of 1910, and the amount has been prorated on the basis of the quantity sold in each year.

In 1909 and 1910 the regular cash discount was 1 per cent. Since then the usual discount has been 2 per cent for cash in seven days. Company No. 35 sold its sugar net as did No. 13 in 1909 and 1910. Practically all sugar is sold on a cash basis, and the losses from bad debts are practically nothing.

Storage and insurance are charges on unsold sugar which has been shipped to distributing points. A dealer, for example, at some central point may buy less than a car load. The company ships a car to him in order to save freight charges and some time may elapse before the remainder of the car is sold. The dealer buying the remainder of the car pays the freight from the distributing point. Insurance on sugar in their own warehouses, however, is included with the insurance of factory buildings, etc., and therefore included in factory costs.

The charge for allowances arises from the fact that the price to the wholesaler is guaranteed. That is to say, when the manufacturer makes a sale he guarantees the wholesaler or jobber against a decline in price. When sugar was sold it was billed at the market price on the day of sale, but the manufacturer guaranteed the wholesaler or jobber that in final settlement the price should not exceed the market at the time of delivery. Thus, if a quantity of sugar was sold on a day when the price was, say, $5 per 100 pounds, but when delivered, say, 10 or 20 days hence, the market was then $4.80 per 100 pounds, the wholesaler was allowed the difference. On the other hand, if the market advanced to, say, $5.10 per 100 pounds, the wholesaler still got his sugar at $5. In other words, the manufacturer guaranteed the wholesaler or jobber against loss on a declining market, but did not receive the reciprocal advantage of an advanced price upon a rising market.

While it was formerly the custom among cane-sugar refiners to guarantee the price against decline, this has not been the case for some years. A large refiner states that the cane-sugar refiners abandoned this custom because the margin between the price of raw and refined sugars has been so reduced that there was nothing left as an insurance against the risk taken in guaranteeing against decline.

The argument in favor of the guarantee is that it enables the manufacturer or refiner to keep a considerable amount of business on his books under contract. The beet factories operate but about three months in the year and contract for their raw material a year ahead at a fixed price. They thus know about what it will cost to produce granulated sugar so that a rising market simply increases their profits without affecting their cost of production. They are, therefore, in a better position to guarantee the price than cane refiners. Probably the main reason, however, for maintaining this custom among beet sugar manufacturers is their desire to sell as much of their product as possible in territory near the point of manufacture. By guaranteeing against a decline in price they are better able to book their output in near-by territory where they have the most favorable freight rates. Since their cost of production is practically determined long in advance of the time of manufacture they are placed at no greater competitive disadvantage because of guaranteeing the price than they would be at if they did not do so but met competition from cane sugar as it comes.

NET PRICES RECEIVED.—The delivered price for beet sugar is based upon the price of granulated cane sugar at New York, New Orleans, or San Francisco. This price is adjusted by the freight to the distributing point, and by the allowance of a differential against beet sugar. Although beet and cane sugar are chemically the same, there is a preference for cane sugar which compels beet sugar to be sold at a lower price. The amount of this differential depends largely on the strength of the preference for cane sugar in a particular territory but to some extent on market conditions. The usual differential is 10 cents per 100 pounds though it is sometimes as low as 5 cents and at others as high as 20 cents or more. Other conditions which account for the difference in the selling price of the various companies are the time of marketing the product, freight rates, competitive conditions in the different markets, quality of the sugar produced, etc.

In 1913–14 the average net price received at the factory ranged from $3.7492 for company No. 7 to $4.6986 per 100 pounds for company No. 22, the average for all companies being $3.9597. The differences of course are due in many cases to the differences in the cost of selling. For example, the selling price of companies Nos. 1, 17, 24, 29, and 34 was higher than the average for all companies, yet due to the high freight charges the average net price received was less than the average for all companies. In this year some differences may also be accounted for by the fact that during the first half of 1914 the price of sugar was low, so that the average price for the companies which closed their books January 1 would be somewhat higher than

for those which did not close their books until the following April or May. The averages for companies Nos. 21 and 22 are high in all years since they are able to sell their product largely in noncompetitive territory. The average net price received for all companies in 1909–10 was $5.0561 per 100 pounds, in 1910–11 $4.9674, in 1911–12 $5.4216, and in 1912–13 $4.9225. The range in prices received by the various companies is widest in the year 1911–12. This was due to the sudden rise in the price of sugar during the year caused by the shortage of the beet crop in Europe. Companies whose season began early no doubt sold large quantities in August or early in September, while others sold a large part of their product in October or November when the price was highest. For example, the difference in the average net price received by company No. 5 and company No. 30 was not more than 5 cents in other years, while in this year the latter company received 71 cents per bag less than company No. 5. In 1911–12 company No. 30 sold more sugar in August than in any other month, while company No. 5 did not begin making sugar until the 1st of October. As will be seen, however, in Table 25 below, the bulk of the product is not sold during the short producing period as might be supposed and as is sometimes claimed.

WHEN BEET SUGAR IS SOLD.—Although practically all beet sugar is made between August 1 and January 1 it is placed on the market throughout the greater part of the year. The quantity sold in each month was secured from 30 of the 37 companies which in 1913–14 sold 95 per cent of the total quantity sold by all companies. No information as to the time of selling was secured from any factory in Wisconsin. In the table below the per cent of sales made in each month is shown by States:

TABLE 25.—PERCENTAGE OF TOTAL SALES OF BEET SUGAR MADE IN EACH MONTH, BY YEARS AND BY STATES OF PRODUCTION, 1910-11 TO 1913-14.

	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Total.
1910-11.													
Arizona	3.7	5.0	9.2	16.5	5.9	7.7	12.3	9.4	6.6	7.5	7.5	8.7	100.0
California	10.4	2.4	2.9	2.8	5.7	20.1	17.6	10.1	7.4	7.0	5.8	7.8	100.0
Colorado	10.5	3.8	7.6	6.3	7.8	8.3	5.6	6.0	9.2	13.4	8.5	13.0	100.0
Iowa	.....	.....	.....	.....	.....	.....	.....	11.7	30.2	31.6	16.7	9.8	100.0
Kansas	13.9	2.2	3.2	8.6	5.2	4.7	4.9	3.5	10.8	15.7	6.6	20.7	100.0
Michigan	2.8	0.2	0.2	0.0	0.0	1.2	1.7	7.3	15.6	23.6	16.9	30.5	100.0
Montana	33.6	2.3	4.7	4.2	6.2	3.9	5.0	5.4	5.7	10.6	6.9	11.5	100.0
Nebraska	.....	.....	.....	.....	.....	.....	.....	10.0	16.6	22.7	13.7	37.0	100.0
Ohio	.....	.....	.....	.....	.....	.....	.....	6.2	33.2	33.3	24.8	2.5	100.0
Utah and Idaho	16.7	14.6	10.5	7.0	5.7	4.9	8.0	3.3	7.1	8.6	5.4	8.2	100.0
Total	10.1	3.9	4.6	3.8	4.9	9.6	8.7	7.2	10.2	13.3	9.3	14.4	100.0

TABLE 25.—PERCENTAGE OF TOTAL SALES OF BEET SUGAR MADE IN EACH MONTH, BY YEARS AND BY STATES OF PRODUCTION, 1910-11 TO 1913-14—Continued.

	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Total.
1911-12.													
Arizona	4.9	8.7	7.2	8.6	8.8	14.4	17.5	4.3	5.5	5.2	14.5	0.4	100.0
California	7.3	4.0	3.5	5.0	3.9	17.3	21.4	13.6	3.0	5.7	3.0	12.3	100.0
Colorado	12.0	4.2	7.1	5.8	6.5	1.9	1.4	11.8	10.8	8.6	11.9	18.0	100.0
Iowa	.....	.....	.....	.....	.....	.....	.....	11.0	41.6	13.4	20.8	13.2	100.0
Kansas	39.1	16.5	9.0	14.9	6.5	0.1	.....	.....	0.0	0.6	6.5	6.8	100.0
Michigan	19.2	3.0	0.3	0.0	0.0	0.0	0.0	15.4	20.0	10.5	19.2	12.4	100.0
Montana	16.4	2.8	5.7	7.9	6.1	1.8	1.7	14.4	5.4	5.0	10.2	22.6	100.0
Nebraska	10.6	4.0	3.8	3.3	7.1	5.9	0.4	23.3	11.5	7.2	7.7	15.2	100.0
Ohio	0.6	.....	.....	.....	.....	.....	.....	17.4	26.1	19.5	29.3	7.1	100.0
Utah and Idaho	5.9	5.3	11.6	12.0	10.1	4.5	2.7	17.9	3.0	3.9	6.4	16.7	100.0
Total	11.2	4.0	5.0	5.3	4.8	7.0	7.8	14.2	9.0	7.3	9.6	14.8	100.0
1912-13.													
Arizona	0.2	0.5	0.7	0.8	29.0	17.5	9.7	11.6	4.3	7.4	8.4	9.9	100.0
California	4.5	4.3	5.7	4.6	3.8	10.3	18.7	8.9	8.8	10.7	9.6	10.1	100.0
Colorado	2.6	2.5	1.8	1.3	3.0	7.4	9.9	5.4	8.9	10.9	19.3	27.0	100.0
Iowa	.....	.....	.....	.....	.....	.....	.....	15.3	36.2	19.8	22.3	6.4	100.0
Kansas	2.3	1.3	1.2	0.3	1.7	9.7	3.6	3.4	5.4	12.8	22.1	36.2	100.0
Michigan [1]	3.9	3.5	3.6	6.5	5.5	2.8	0.6	1.2	12.8	23.4	21.2	15.0	100.0
Montana	20.2	2.2	6.3	5.7	6.9	4.5	2.1	7.6	5.4	9.1	12.8	17.2	100.0
Nebraska	2.6	4.2	3.3	2.6	7.1	10.1	6.7	3.6	9.1	15.2	15.9	19.6	100.0
Nevada	.....	.....	.....	.....	.....	.....	.....	7.1	50.3	35.5	3.5	3.6	100.0
Ohio	0.1	0.0	0.3	0.7	0.6	0.0	0.1	14.5	23.0	24.2	25.1	11.4	100.0
Utah and Idaho	9.1	6.0	14.1	14.7	15.5	8.8	4.3	2.3	3.9	5.4	6.7	9.2	100.0
Total	4.9	3.6	5.1	5.3	5.7	7.2	8.8	5.5	9.4	13.1	15.1	16.3	100.0
1913-14.													
Arizona	12.6	12.2	11.8	7.4	28.1	22.1	5.8	.....	.....	.....	.....	.....	100.0
California	7.3	4.8	7.0	7.6	6.6	18.3	19.2	12.1	7.5	5.7	2.5	1.4	100.0
Colorado	14.4	7.2	10.9	8.0	9.5	4.4	2.8	6.5	10.0	5.6	11.6	9.1	100.0
Iowa	6.8	2.8	7.0	1.6	1.7	0.0	.....	16.7	31.9	13.1	15.3	3.1	100.0
Kansas	42.9	24.9	12.5	4.0	.....	.....	.....	.....	1.8	4.1	5.8	4.0	100.0
Michigan [1]	4.1	0.7	0.2	0.2	0.1	0.0	0.1	16.4	19.9	16.7	22.1	19.5	100.0
Minnesota	.....	.....	.....	.....	.....	.....	.....	31.7	40.5	22.0	5.2	0.6	100.0
Montana	7.9	5.9	8.5	7.1	10.1	7.7	8.0	8.6	11.9	5.4	9.7	9.2	100.0
Nebraska	14.3	6.2	8.0	7.3	6.6	8.5	5.8	7.6	10.0	9.2	8.7	7.8	100.0
Nevada	0.4	2.2	5.6	0.9	2.4	0.3	2.6	4.4	58.1	12.6	2.4	8.1	100.0
Ohio	2.4	0.9	0.1	0.3	0.0	0.0	.....	18.5	20.4	10.6	22.2	24.6	100.0
Utah and Idaho	7.1	6.2	9.9	14.3	19.2	9.7	10.6	5.7	4.8	4.9	5.2	2.4	100.0
Total	9.9	5.5	7.9	7.5	8.5	8.3	8.0	9.6	10.5	7.2	9.5	7.6	100.0

[1] Includes the sugar sold from the Decatur, Ind., factory.

The above table shows that the companies with factories in Michigan sold practically all of their product before April, except in the year 1912–13. In that year 22.5 per cent of the total amount was sold during the period from April to September, no doubt due to the fact that many of the factories did not close the 1911–12 campaign until March. In California manufacture begins earlier than in other States and about one-third of the product is sold in August

and September, although large quantities are sold in each month. In Colorado, Montana, Utah, and Idaho a larger per cent is marketed later in the year, and the companies with factories in Utah and Idaho in 2 of the 4 years sold more than 30 per cent of their product during June and July. The product of the companies in Nevada, Ohio, Arizona, Iowa, and Minnesota is small and is disposed of shortly after it is made. In Arizona manufacturing usually begins in July, a large part of their product being sold during July and August. In Kansas and Nebraska the product is sold at various times of the year, but usually the larger per cent of it is disposed of by the end of February. In 2 years, however, the Garden City Sugar & Land Co. sold about 40 per cent of its product in March.

Of the total amount sold by the companies included less than one-half was sold during the sugar-making season. In 1910–11 49 per cent was sold during the period from August 1 to January 1; in 1911–12 45.3 per cent, in 1912–13 44 per cent, and in 1913–14 43.6 per cent. In the latter year the per cent was even less than shown since the quantities sold during January and February by certain California companies which closed their books January 1 is not included. In three of the four years more sugar was sold in February than in any other month. While the total product amounts to only about one-sixth of the sugar consumed in the United States, if it were all put on the market during the producing period no doubt the effect on prices for cane granulated sugar would be quite noticeable. Beet sugar is produced during only five or six months of the year and most of it in three or four months, but it is sold throughout the year. Not more than 16.3 per cent of the product in any year is sold in a single month. That the average price for cane refined sugar is more often higher than lower while beet sugar is being made is shown in the statement below. As the campaigns of certain factories sometimes extend into January, the average price for the six months from February 1 to July 31 has been compared with the average price for the six months ending January 31.

AVERAGE QUOTATIONS FOR GRANULATED SUGAR AT NEW YORK, FEBRUARY, 1906, TO JANUARY, 1915, BY 6-MONTH PERIODS.

[Cents per pound.]

	1914–15	1913–14	1912–13	1911–12	1910–11	1909–10	1908–9	1907–8	1906–7
Feb. 1 to July 31	3.97	4.20	5.15	4.79	5.08	4.68	5.12	4.68	4.43
Aug. 1 to Jan. 31	5.63	4.25	4.79	5.99	4.82	4.90	4.73	4.64	4.63

It is noted in the above statement that the price of sugar was higher during the period in which beet sugar is made in 5 of the 9 years than during the period in which no beet sugar is made. The average price during the latter period for the 9 years was 4.68 cents per pound as compared with 4.93 cents for the period in which beet sugar is produced.

Quotations of granulated sugar at New York by months, for the 26 years ending with 1915, are shown in Table 27, at the end of this chapter. This table also shows the price of Cuban raw sugar 96 degrees duty paid and the margin between raw and refined sugar at New York. In some years prices of granulated sugars were lower during the beet-sugar producing period and in some they were higher. In 1908, 1910, and 1912 the range was lower during the beet season. In 1909, 1911, and 1914 it was higher. In 1913 there was not much variation. If prices were uniformly lower during the beet-producing season it would indicate that it was due to the influence of beet sugar. Since this is not the case, the cause of lower prices in some years must be sought elsewhere than in the sale of beet sugar. Fluctuations in price are probably due mainly to world conditions in the sugar market and in times past no doubt monopolistic conditions have had considerable influence on prices in this country.

In this connection it is of interest to note that the prices of sugar are considerably higher in those sections of the country where there is little or no competition from Cuban sugar. This lack of competition is due mainly, if not entirely, to high freight rates from refining centers. A compilation of weekly quotations in Detroit, Denver, and San Francisco for beet sugar has been made for the year 1913–14 and the differences between the quotations in these markets and the New York quotations for granulated cane sugar are shown in Table 26 below. At practically all times the quotations for beet sugar in these three markets are above the quotations for cane sugar in New York. The quotations for Detroit were taken from the Detroit News and the Detroit Free Press; those for Denver were supplied by the Great Western Sugar Co., while those for San Francisco were taken from the San Francisco Examiner.

TABLE 26.—EXCESS OF DETROIT, DENVER, AND SAN FRANCISCO QUOTATIONS FOR GRANULATED SUGAR (BEET) OVER NEW YORK QUOTATIONS (CANE), WEEKLY 1913 AND 1914.

[Cents per 100 pounds.]

1913				1914			
Date.	Detroit over New York.[1]	Denver over New York.	San Francisco over New York.	Date.	Detroit over New York.	Denver over New York.	San Francisco over New York.
Jan. 2	$0.25	$0.40	$0.20	Jan. 8	$0.33	$0.53	$0.23
9	.24	.54	.24	15	.23	.53	.23
16	.24	.54	.24	22	.23	.53	.23
23	.24	.54	.24	29	.23	.53	.23
30	.39	.59	.29	Feb. 5	.23	.53	.23
Feb. 6	.43	.63	.33	12	.23	.43	.13
13	.44	.59	.29	19	.33	.43	.13
20	.48	.63	.33	26	.38	.43	.13
27	.38	.63	.33	Mar. 5	.38	.43	.13

[1] No quotations in Detroit from May 8 to Oct. 30.

TABLE 26.—EXCESS OF DETROIT, DENVER, AND SAN FRANCISCO QUOTATIONS FOR GRANULATED SUGAR (BEET) OVER NEW YORK QUOTATIONS (CANE), WEEKLY, 1913 AND 1914—Continued.

1913				1914			
Date.	Detroit over New York.[1]	Denver over New York.	San Francisco over New York.	Date.	Detroit over New York.	Denver over New York.	San Francisco over New York.
Mar. 6	$0.34	$0.59	$0.29	Mar. 12	$0.48	$0.53	$0.23
13	.39	.59	.29	19	.43	.43	.08
20	.43	.63	.33	26	.48	.43	.08
27	.33	.63	.33	Apr. 2	.48	.43	.08
Apr. 3	.33	.63	.33	9	.57	.52	.17
10	.43	.73	.43	16	.57	.52	.17
17	.33	.73	.23	23	.51	.46	.11
24	.28	.68	.18	30	.51	.46	.11
May 1	.28	.58	.18	May 7	.42	.47	.12
8	(1)	.58	.28	14	.33	.43	.03
15	.....	.58	.28	21	.38	.43	.08
22	.....	.68	.38	28	.38	.43	.08
28	.....	.58	.28	June 4	.38	.43	.08
June 5	.....	.58	.28	11	.38	.43	.08
12	.....	.58	.28	18	.29	.44	.09
19	.....	.58	.28	25	.39	.44	.09
26	.....	.59	.29	July 2	.39	.44	.09
July 2	.....	.49	.19	9	.39	.44	.09
10	.....	.49	.19	16	.49	.44	.09
17	.....	.49	.19	23	.49	.44	.09
24	.....	.49	.19	30	.63	.48	.13
31	.....	.49	.19	Aug. 6	.50	[2].05	[2].40
Aug. 7	.....	.39	.09	13	.29	.49	[2].06
14	.....	.49	.19	20	.80	.50	[2].05
21	.....	.49	.19	27	.79	.49	[2].06
28	.....	.59	.29	Sept. 3	.79	.49	[2].06
Sept. 4	.....	.69	.39	11	.79	.49	[2].06
11	.....	.69	.39	17	.79	.49	[2].06
18	.....	.69	.39	24	1.27	.97	.42
25	.....	.59	.29	Oct. 1	1.03	.73	.18
Oct. 2	.....	.54	.54	8	.62	.42	.17
9	.....	.63	.43	15	.87	.42	.17
16	.....	.58	.28	22	.47	.52	.27
23	.....	.48	.18	29	.51	.36	.36
30	.....	.48	.18	Nov. 5	.60	.15	.15
Nov. 6	.49	.54	.24	12	.50	.15	.15
13	.49	.54	.24	19	.25	.15	.15
20	.49	.54	.24	25	.25	.25	.15
26	.39	.54	.24	Dec. 3	.35	.45	.25
Dec. 4	.43	.58	.28	10	.35	.55	.25
11	.33	.58	.28	17	.40	.55	.25
18	.38	.53	.23	24	.50	.55	.25
24	.33	.53	.23	30	.40	.45	.15
31	.43	.53	.33				
Weekly average	.37	.57	.27	Weekly average	.48	.45	.12

[1] No quotations in Detroit from May 8 to Oct. 30.

[2] Under.

No quotations for Detroit were available from the sources used from May to October, inclusive, 1913. This is due to the fact that during that year there was but little beet sugar upon that market during these months. The 1912 crop had been sold by the end of April and the 1913 crop was not on the market until about November 1.

The margin between the quotations in Denver and New York were generally considerably wider than the margins between the other markets and New York. The only exception was between Detroit and New York during a few months in 1914. From about August 1 to the middle of September, 1914, the San Francisco price was slightly under the New York price, and this is true with respect to Denver for a few days near August 1. The probable explanation for the disturbed margins from August to November, inclusive, 1914, is that the sugar market was rapidly adancing about this time on account of war conditions in Europe.

The more narrow margins between New York, Detroit, and San Francisco are due to the fact that sugar from the Atlantic seaboard can reach the natural markets of Michigan sugar factories upon a low freight rate, and that the cane sugar refineries in San Francisco compete with the beet-sugar factories in California. To reach Denver cane sugar must pay an ocean and rail rate of 71 cents from New York or an all-rail rate of 62 cents from New Orleans. The comparisons shown in the table clearly indicate that the competition of cane sugar from the eastern refineries and the presence of cane-sugar refineries in San Francisco tend to reduce the price. The average excess of the San Francisco price over New York due to the competition of cane sugar was 27 cents in 1913 and only 12 cents in 1914, while in Denver, where there is little cane sugar competition, the average excess over New York was 57 cents in 1913 and 45 cents in 1914. The average excess of prices in Detroit over those of New York in 1914 was 48 cents, but as stated this was due to abnormal conditions. The average excess of Detroit over New York for six months in 1913 was only 37 cents.

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, AND MARGIN BETWEEN RAW AND REFINED, BY WEEKS, 1890 TO 1914.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.	Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1890.[1]	*Cents.*	*Cents.*	*Cents.*	1890.	*Cents.*	*Cents.*	*Cents.*
Jan. 2	6.50	5.75	0.75	Feb. 6	6.25	5.625	0.625
9	6.50	5.75	.75	13	6.375	5.625	.75
16	6.50	5.625	.875	20	6.313	5.625	.688
23	6.50	5.688	.812	27	6.313	5.625	.688
30	6.375	5.625	.75	Mar. 6	6.375	5.688	.687

[1] Less 2 per cent for cash, for granulated; less 2½ per cent for cash, for Cuban centrifugal 90° (duty paid).

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1890.	*Cents.*	*Cents.*	*Cents.*
Mar. 13	6.438	5.688	0.750
20	6.313	5.688	.625
27	6.125	5.438	.687
Apr. 3	6.063	5.375	.688
10	6.032	5.375	.657
17	6.188	5.50	.688
24	6.188	5.50	.688
May 1	6.188	5.563	.625
8	6.063	5.563	.500
15	6.032	5.375	.657
22	6.00	5.375	.625
29	6.125	5.438	.687
June 5	6.344	5.50	.844
12	6.781	5.563	1.218
19	6.625	5.438	1.187
26	6.250	5.375	.875
July 3	6.25	5.375	.875
10	6.281	5.375	.906
17	6.25	5.438	.812
24	6.156	5.438	.718
31	6.125	5.50	.625
Aug. 7	6.063	5.50	.563
14	6.125	5.625	.50
21	6.188	5.625	.563
28	6.188	5.688	.50
Sept. 4	6.50	5.875	.625
11	6.625	6.063	.562
18	6.625	6.063	.562
25	6.625	6.00	.625
Oct. 2	6.625	5.938	.687
9	6.625	5.938	.687
16	6.625	6.00	.625
23	6.625	6.00	.625
30	6.50	5.938	.562
Nov. 6	6.375	5.875	.50
13	6.125	5.50	.625
20	6.125	5.50	.625
28	6.125	5.375	.75
Dec. 4	6.125	5.375	.75
11	6.125	5.313	.812
18	6.00	5.25	.75
26	6.00	5.25	.75
31	6.00	5.25	.75
Average	6.171	5.445	.726
1891.			
Jan. 8	5.84	5.12	.72
15	5.84	5.12	.72
22	6.13	5.50	.63
29	6.00	5.50	.50
Feb. 5	6.13	5.50	0.63
12	6.37	5.62	.75
19	6.37	5.62	.75
26	6.41	5.62	.79
Mar. 5	6.61	5.62	.99
12	6.37	5.62	.75
19	6.13	5.56	.57
26	6.13	5.68	.45
Apr. 2[1]	4.50	3.53	.97
9	4.50	3.625	.875
16	4.50	3.50	1.00
23	4.50	3.50	1.00
30	4.50	3.44	1.06
May 7	4.375	3.25	1.125
14	4.50	3.25	1.25
21	4.25	3.25	1.00
28	4.18	3.25	.93
June 4	4.125	3.375	.75
11	4.06	3.375	.685
18	4.06	3.31	.75
25	4.18	3.44	.74
July 2	4.25	3.375	.875
9	4.25	3.31	.94
16	4.31	3.375	.935
23	4.25	3.44	.81
30	4.25	3.31	.94
Aug. 6	4.06	3.375	.685
13	4.125	3.44	.685
20	4.25	3.44	.81
27	4.18	3.44	.74
Sept. 3	4.25	3.44	.81
10	4.31	3.50	.81
17	4.375	3.44	.935
24	4.375	3.44	.935
Oct. 1	4.375	3.31	1.065
8	4.375	3.375	1.00
15	4.375	3.44	.935
22	4.06	3.27	.79
29	4.125	3.31	.81⅝
Nov. 5	4.06	3.44	.62
12	4.06	3.50	.56
19	4.25	3.50	.75
25	4.18	3.50	.68
Dec. 3	4.18	3.50	.68
10	4.18	3.375	.805
17	4.00	3.31	.69
24	4.00	3.375	.625
31	4.00	3.375	.625
Average	4.641	3.863	.778

[1] About 2¢ per pound duty taken off April 1, 1891.

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1892.	*Cents.*	*Cents.*	*Cents.*
Jan. 7	4.04	3.50	0.54
14	3.92	3.47	.45
21	3.92	3.47	.45
28	3.92	3.44	.48
Feb. 4	3.92	3.44	.48
11	3.92	3.44	.48
18	3.92	3.44	.48
25	3.92	3.41	.51
Mar. 3	4.07	3.41	.66
10	4.19	3.375	.815
17	4.29	3.375	.915
24	4.29	3.25	1.04
31	4.28	3.125	1.155
Apr. 7	4.28	3.125	1.155
14	4.28	3.125	1.155
21	4.18	3.125	1.055
28	4.18	3.125	1.055
May 5	4.22	3.125	1.095
12	4.22	3.125	1.095
19	4.22	3.06	1.16
26	4.22	3.06	1.16
June 2	4.22	3.06	1.16
9	4.28	3.125	1.155
16	4.28	3.125	1.155
23	4.22	3.18	1.04
30	4.28	3.125	1.155
July 7	4.22	3.125	.995
14	4.16	3.06	1.10
21	4.16	3.06	1.10
28	4.22	3.125	1.095
Aug. 4	4.23	3.125	1.105
11	4.23	3.18	1.05
18	4.35	3.25	1.10
25	4.47	3.375	1.095
Sept. 1	4.71	3.56	1.15
8	4.90	3.56	1.34
15	4.90	3.56	1.34
22	4.90	3.625	1.275
29	4.90	3.75	1.15
Oct. 6	4.72	3.50	1.22
13	4.72	3.50	1.22
20	4.72	3.44	1.28
27	4.72	3.44	1.28
Nov. 3	4.72	3.375	1.345
10	4.60	3.375	1.225
17	4.60	3.375	1.225
25	4.60	3.375	1.225
Dec. 1	4.60	3.375	1.225
8	4.60	3.375	1.225
Dec. 15	4.60	3.375	1.225
22	4.60	3.44	1.16
29	4.60	3.44	1.16
Average	4.346	3.311	1.035
1893.			
Jan. 5	4.60	3.44	1.16
12	4.60	3.44	1.16
19	4.60	3.50	1.10
26	4.60	3.50	1.10
Feb. 2	4.60	3.44	1.16
9	4.60	3.44	1.16
16	4.54	3.44	1.10
23	4.47	3.375	1.095
Mar. 2	4.47	3.375	1.095
9	4.47	3.375	1.095
16	4.47	3.34	1.13
23	4.54	3.50	1.04
30	4.72	3.625	1.095
Apr. 6	4.84	3.75	1.09
13	4.84	3.75	1.09
20	3.90	3.875	1.025
27	5.08	4.00	1.08
May 4	5.08	4.00	1.08
11	5.20	4.125	1.075
18	5.08	4.00	1.08
25	5.08	4.25	.83
June 1	5.08	4.25	.83
8	5.21	4.25	.96
15	5.27	4.50	.77
22	5.27	4.50	.77
29	5.27	4.375	.895
July 6	5.27	4.375	.895
13	5.34	4.375	.965
20	5.34	4.18	1.16
27	5.08	3.75	1.33
Aug. 3	5.08	3.75	1.33
10	5.08	3.75	1.33
17	5.08	3.75	1.33
24	5 08	3.50	1.58
31	5.08	3.50	1.58
Sept. 7	5.08	3.50	1.58
14	5.08	3.75	1.33
21	5.08	3.84	1.24
28	5.08	3.875	1.205
Oct. 5	5.08	3.875	1.205
12	5.08	3.875	1.205
19	5.08	4.00	1.08
26	5.08	4.00	1.08

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1893.	*Cents.*	*Cents.*	*Cents.*
Nov. 2	4.72	3.25	1.47
9	4.47	3.25	1.22
16	4.47	3.18	1.29
23	4.23	3.00	1.23
Dec. 1	4.23	3.00	1.23
7	4.23	3.00	1.23
14	4.23	2.875	1.355
21	4.23	2.875	1.355
28	4.10	2.875	1.225
Average	4.842	3.689	1.153
1894.			
Jan. 4	3.74	2.75	.99
11	3.98	2.875	1.105
18	4.10	3.00	1.10
25	4.04	3.00	1.04
Feb. 1	3.98	3.06	.92
8	4.04	3.25	.79
15	4.17	3.31	.86
23	4.17	3.31	.86
Mar. 1	4.17	3.18	.99
8	4.17	3.18	.99
15	4.17	3.18	.99
22	3.98	3.00	.98
29	3.98	2.875	1.105
Apr. 5	3.98	2.875	1.105
12	3.98	2.875	1.105
19	3.98	2.75	1.23
26	3.98	2.81	1.17
May 3	3.86	2.875	.985
10	3.91	2.91	1.00
17	3.91	2.81	1.10
24	3.91	2.75	1.16
31	3.86	2.875	.985
June 7	3.80	3.00	.80
14	3.98	3.125	.855
21	3.98	3.125	.855
28	3.98	3.125	.855
July 5	3.98	3.125	.855
12	3.98	3.18	.80
19	4.23	3.125	1.105
26	4.23	3.125	1.105
Aug. 2	4.35	3.125	1.225
9	4.47	3.375	1.095
16	4.47	3.50	.97
23	4.60	3.75	.85
30	[1] 4.72	[1] 3.75	.97
Sept. 6	4.72	3.75	.97
13	4.72	3.75	.97
Sept. 20	4.54	3.75	0.79
27	4.41	3.75	.66
Oct. 4	4.35	3.75	.60
11	4.35	3.75	.60
18	4.35	3.50	.85
25	4.35	3.50	.85
Nov. 1	3.98	3.50	.48
8	4.10	3.50	.60
15	4.10	3.50	.60
22	3.98	3.50	.48
29	3.98	3.50	.48
Dec. 6	3.80	3.50	.30
13	3.74	3.25	.49
20	3.74	3.125	.615
27	3.74	3.125	.615
Average	4.12	3.24	.88
1895.			
Jan. 3	3.74	3.00	.74
10	3.74	3.00	.74
17	3.74	3.00	.74
24	3.74	3.03	.71
31	3.74	3.09	.65
Feb. 7	3.68	3.125	.555
14	3.68	3.00	.68
21	3.74	3.00	.74
28	3.74	3.00	.74
Mar. 7	3.80	3.00	.80
14	3.86	3.00	.86
21	3.86	3.00	.86
28	3.86	3.00	.86
Apr. 4	3.86	3.00	.86
11	3.86	3.00	.86
18	3.86	3.00	.86
25	3.86	3.00	.86
May 2	3.98	3.125	.855
9	4.35	3.25	1.10
16	4.35	3.375	.975
23	4.35	3.375	.975
31	4.35	3.375	.975
June 6	4.35	3.375	.975
13	4.35	3.31	1.04
20	4.35	3.31	1.04
27	4.35	3.25	1.10
July 5	4.35	3.25	1.10
11	4.35	3.25	1.10
18	4.35	3.25	1.10
25	4.35	3.25	1.10
Aug. 1	4.35	3.25	1.10

[1] Including 40 per cent duty from Aug. 28, 1894.

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1895.	*Cents.*	*Cents.*	*Cents.*
Aug. 8	4.35	3.31	1.04
15	4.35	3.31	1.04
22	4.23	3.25	.98
29	4.10	3.25	.85
Sept. 5	4.16	3.25	.91
12	4.23	3.25	.98
19	4.41	3.31	1.10
26	4.47	3.50	.97
Oct. 3	4.53	3.56	.97
10	4.47	3.625	.845
17	4.47	3.625	.845
24	4.35	3.50	.85
31	4.23	3.40	.83
Nov. 7	4.23	3.375	.855
14	4.23	3.375	.855
21	4.23	3.375	.855
27	4.35	3.375	.975
Dec. 5	4.35	3.50	.85
12	4.35	3.50	.85
19	4.35	3.50	.85
27	4.72	3.75	.97
Average	4.152	3.27	.882
1896.			
Jan. 3	4.72	3.75	.97
9	4.59	3.75	.84
16	4.59	3.75	.84
23	4.72	3.875	.845
30	4.65	3.875	.775
Feb. 6	4.58	3.875	.705
13	4.65	4.00	.65
20	4.72	4.125	.595
27	4.72	4.125	.595
Mar. 5	4.72	4.125	.595
12	4.72	4.125	.595
19	4.84	4.18	.66
26	4.84	4.18	.66
Apr. 2	4.84	4.18	.66
9	5.08	4.25	.83
16	5.20	4.375	.825
23	5.20	4.31	.89
30	5.14	4.25	.89
May 7	5.08	4.25	.83
14	5.08	4.25	.83
21	4.84	4.00	.84
28	4.97	4.00	.97
June 4	4.72	3.75	.97
11	4.78	3.81	.97
18	4.66	3.625	1.035

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1896.	*Cents.*	*Cents.*	*Cents.*
June 25	4.47	3.50	0.97
July 2	4.60	3.50	1.10
9	4.47	3.44	1.03
16	4.47	3.375	1.095
23	4.35	3.31	1.04
30	4.35	3.31	1.04
Aug. 6	4.60	3.50	1.10
13	4.60	3.375	1.225
20	4.47	3.375	1.095
27	4.47	3.375	1.095
Sept. 3	4.47	3.25	1.22
10	4.47	3.25	1.22
17	4.47	3.06	1.41
24	4.47	3.00	1.47
Oct. 1	4.24	3.06	1.18
8	3.98	3.00	.98
15	3.86	3.00	.86
22	3.86	3.00	.86
29	3.98	3.25	.73
Nov. 5	3.98	3.25	.73
12	4.23	3.44	.79
19	4.10	3.25	.85
27	4.10	3.25	.85
Dec. 3	4.10	3.31	.79
10	4.10	3.25	.85
17	4.10	3.25	.85
24	4.10	3.18	.92
31	4.10	3.18	.92
Average	4.532	3.624	.908
1897.			
Jan. 7	4.10	3.18	.92
14	4.10	3.18	.92
21	3.98	3.18	.80
28	3.98	3.18	.80
Feb. 4	3.98	3.18	.80
11	4.10	3.18	.92
18	4.10	3.25	.85
25	4.10	3.25	.85
Mar. 4	3.98	3.25	.73
11	4.10	3.18	.92
18	4.23	3.25	.98
25	4.23	3.31	.92
Apr. 1	4.47	3.375	1.095
8	4 47	3.375	1.095
15	4.23	3.28	.95
22	4.23	3.25	.98
29	4.23	3.25	.98
May 6	4.29	3.31	.98

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1897.	*Cents.*	*Cents.*	*Cents.*
May 13	4.29	3.31	0.98
20	4.23	3.25	.98
27	4.23	3.25	.98
June 3	4.23	3.31	.92
10	4.47	3.50	.97
17	4.47	3.50	.97
24	4.47	3.50	.97
July 1	4.47	3.50	.97
8	4.59	3.50	1.09
15	4.59	3.625	.965
22	4.66	3.625	1.035
29	[1] 4.72	[2] 3.75	.97
Aug. 5	4.72	3.75	.97
12	4.72	3.75	.97
19	4.72	3.75	.97
26	4.72	3.75	.97
Sept. 2	4.72	3.75	.97
9	4.815	3.875	.94
16	4.815	3.875	.94
23	4.815	3.94	.875
30	4.85	3.94	.91
Oct. 7	4.85	3.875	.975
14	4.85	3.875	.975
21	4.85	3.81	1.04
28	4.72	3.81	.91
Nov. 4	4.72	3.81	.91
11	4.72	3.81	.91
18	4.72	3.875	.845
26	4.72	3.875	.845
Dec. 2	4.72	3.875	.845
9	4.72	3.94	.78
16	4.84	4.00	.84
23	4.96	4.125	.835
30	4.96	4.25	.71
Average	4.503	3.557	.946
1898.			
Jan. 6	4.96	4.18	.78
13	4.96	4.18	.78
20	4.96	4.06	.90
27	4.84	4.06	.78
Feb. 3	4.84	4.06	.78
10	4.96	4.18	.78
17	4.96	4.18	.78
24	5.02	4.18	.84
Mar. 3	4.96	4.18	.78
10	4.84	4.125	.715
17	4.84	4.06	.78
24	4.84	4.00	0.84
31	4.84	4.125	.715
Apr. 7	4.96	4.125	.835
14	4.90	4.125	.775
21	4.96	4.125	.835
28	5.15	4.25	.90
May 5	5.15	4.18	.97
12	5.08	4.18	.90
19	5.08	4.25	.83
26	5.08	4.31	.77
June 2	5.08	4.31	.77
9	5.08	4.31	.77
16	5.08	4.31	.77
23	5.08	4.25	.83
30	5.08	4.25	.83
July 7	5.08	4.125	.955
14	5.08	4.125	.955
21	5.08	4.125	.955
28	5.08	4.125	.955
Aug. 4	5.08	4.125	.955
11	5.08	4.25	.83
18	5.08	4.25	.83
25	5.08	4.31	.77
Sept. 1	5.15	4.375	.775
8	5.21	4.375	.835
15	5.21	4.375	.835
22	5.21	4.31	.90
29	5.08	4.31	.77
Oct. 6	4.72	4.21	.51
13	4.72	4.18	.54
20	4.72	4.25	.47
27	4.78	4.31	.47
Nov. 3	4.78	4.31	.47
10	4.72	4.31	.41
17	4.96	4.44	.52
25	4.96	4.50	.46
Dec. 1	4.96	4.44	.52
8	4.96	4.44	.52
15	4.84	4.44	.40
22	4.75	4.375	.375
29	4.72	4.31	.41
Average	4.965	4.235	.730
1899.			
Jan. 5	4.69	4.31	.38
12	4.72	4.31	.41
19	4.72	4.25	.47
26	4.72	4.25	.47

[1] Including 1.95 cents per pound duty from July 24, 1897.

[2] From July 24, 1897, duty on raw sugar was 1.685 cents per pound.

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.	Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1899.	*Cents.*	*Cents.*	*Cents.*	1900.	*Cents.*	*Cents.*	*Cents.*
Feb. 2	4.72	4.31	0.41	Jan. 4	4.75	4.25	0.50
9	4.72	4.31	.41	11	4.85	4.31	.54
16	4.72	4.31	.41	18	4.85	4.375	.475
23	4.72	4.375	.345	25	4.95	4.375	.575
Mar. 2	4.72	4.375	.345	Feb. 1	5.00	4.44	.56
9	4.84	4.41	.43	8	5.00	4.50	.50
16	4.84	4.375	.465	15	5.00	4.44	.56
23	4.84	4.375	.465	23	5.00	4.44	.56
30	4.84	4.44	.40	Mar. 1	5.00	4.375	.625
Apr. 6	4.84	4.50	.34	8	4.90	4.31	.59
13	4.96	4.56	.40	15	4.90	4.375	.525
20	4.96	4.625	.335	22	4.95	4.44	.51
27	4.96	4.625	.335	29	4.95	4.44	.51
May 4	5.08	4.75	.33	Apr. 5	4.925	4.375	.55
11	5.08	4.625	.455	12	4.95	4.50	.45
18	5.08	4.625	.455	19	4.95	4.44	.51
25	5.08	4.625	.455	26	4.95	4.42	.53
June 1	5.08	4.625	.455	May 3	4.95	4.47	.48
8	5.21	4.69	.52	10	4.95	4.44	.51
15	5.21	4.69	.52	17	4.95	4.47	.48
22	5.21	4.625	.585	24	5.10	4.50	.60
29	5.21	4.50	.71	31	5.30	4.56	.74
July 6	5.21	4.50	.71	June 7	5.40	4.625	.775
13	5.21	4.44	.77	14	5.50	4.625	.875
20	5.21	4.375	.835	21	5.50	4.625	.875
27	5.21	4.50	.71	28	5.59	4.69	.90
Aug. 3	5.21	4.56	.65	July 5	5.69	4.75	.94
10	5.21	4.56	.65	12	5.79	4.75	1.04
17	5.21	4.50	.71	19	5.89	4.81	1.08
24	4.99	4.50	.49	26	5.89	4.875	1.015
31	4.99	4.50	.49	Aug. 2	5.89	4.875	1.015
Sept. 7	4.99	4.44	.55	9	5.86	4.81	1.05
14	4.925	4.375	.55	16	5.86	4.875	.985
21	4.795	4.375	.42	23	5.86	4.875	.985
28	4.795	4.31	.485	30	5.88	4.875	1.005
Oct. 5	4.795	4.31	.485	Sept. 6	5.88	4.94	.94
12	4.795	4.31	.485	13	5.88	5.00	.88
19	4.795	4.31	.485	20	5.88	5.00	.88
26	4.795	4.31	.485	27	5.88	5.00	.88
Nov. 2	4.795	4.31	.485	Oct. 4	5.49	4.91	.58
9	4.795	4.25	.545	11	5.49	4.75	.74
16	4.795	4.25	.545	18	5.49	4.75	.74
23	4.795	4.25	.545	25	5.49	4.625	.865
Dec. 1	4.795	4.25	.545	Nov. 1	5.49	4.375	1.115
7	4.795	4.25	.545	8	5.34	4.375	.965
14	4.795	4.25	.545	15	5.34	4.375	.965
21	4.795	4.25	.545	22	5.34	4.375	.965
28	4.795	4.25	.545	30	5.265	4.375	.89
				Dec. 6	5.315	4.44	.875
Average	4.919	4.419	.50	13	5.315	4.41	.905

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1900.	*Cents.*	*Cents.*	*Cents.*
Dec. 20	5.315	4.375	0.94
27	5.315	4.375	.94
Average	5.32	4.566	.754
1901.			
Jan. 3	5.24	4.375	.865
10	5.34	4.375	.965
17	5.34	4.375	.965
24	5.24	4.25	.99
31	5.24	4.25	.99
Feb. 7	5.24	4.25	.99
14	5.24	4.25	.99
21	5.24	4.22	1.02
28	5.24	4.19	1.05
Mar. 7	5.24	4.06	1.18
14	5.00	4.00	1.00
21	5.00	4.03	.97
28	5.00	4.03	.97
Apr. 4	5.00	4.06	.94
11	5.10	4.10	1.00
18	5.20	4.19	1.01
25	5.20	4.19	1.01
May 2	5.20	4.25	.95
9	5.29	4.28	1.01
16	5.29	4.28	1.01
23	5.29	4.28	1.01
31	5.22	4.25	.97
June 6	5.22	4.25	.97
13	5.22	4.25	.97
20	5.22	4.25	.97
27	5.215	4.25	.965
July 3	5.215	4.25	.965
11	5.215	4.19	1.025
18	5.145	4.15	.995
25	5.145	4.19	.955
Aug. 1	5.145	4.16	.985
8	5.10	4.125	.975
15	5.10	4.00	1.10
22	5.00	4.00	1.00
29	5.00	3.81	1.19
Sept. 5	5.00	3.75	1.25
12	5.00	3.75	1.25
20	5.00	3.75	1.25
26	5.00	3.75	1.25
Oct. 3	4.85	3.75	1.10
10	4.85	3.75	1.10
17	4.85	3.75	1.10
24	4.85	3.81	1.04
31	4.85	3.81	1.04
Nov. 7	4.75	3.75	1.00
14	4.65	3.72	.93
21	4.65	3.69	.96
29	4.65	3.75	.90
Dec. 5	4.65	3.75	.90
12	4.65	3.75	.90
19	4.46	3.75	.71
26	4.37	3.66	.71
Average	5.05	4.047	1.003
1902.			
Jan. 2	4.48	3.625	.855
9	4.48	3.56	.92
16	4.39	3.375	1.015
23	4.485	3.50	.985
30	4.485	3.69	.795
Feb. 6	4.485	3.69	.795
13	4.485	3.625	.86
20	4.535	3.625	.91
27	4.535	3.625	.91
Mar. 6	4.485	3.375	1.11
13	4.485	3.40	1.085
20	4.485	3.44	1.045
27	4.535	3.625	.91
Apr. 3	4.51	3.625	.885
10	4.51	3.375	1.135
17	4.51	3.375	1.135
24	4.51	3.44	1.07
May 1	4.46	3.50	.96
8	4.46	3.50	.96
15	4.41	3.50	.91
22	4.41	3.44	.97
29	4.41	3.44	.97
June 5	4.41	3.44	.97
12	4.45	3.50	.95
19	4.41	3.50	.91
26	4.41	3.31	1.10
July 3	4.41	3.375	1.035
10	4.41	3.31	1.10
17	4.41	3.31	1.10
24	4.41	3.375	1.035
31	4.41	3.375	1.035
Aug. 7	4.41	3.40	1.01
14	4.41	3.40	1.01
21	4.41	3.375	1.035
28	4.41	3.375	1.035
Sept. 4	4.41	3.41	1.00
11	4.41	3.50	.91
18	4.45	3.47	.98

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1902.	*Cents.*	*Cents.*	*Cents.*
Sept. 25	4.45	3.50	0.95
Oct. 2	4.41	3.50	.91
9	4.41	3.50	.91
16	4.41	3.56	.85
23	4.41	3.625	.785
30	4.41	3.625	.785
Nov. 6	4.31	3.625	.685
13	4.21	3.69	.52
20	4.41	3.81	.60
28	4.50	3.875	.625
Dec. 4	4.60	3.97	.63
11	4.70	3.94	.76
18	4.60	3.94	.66
24	4.55	3.94	.61
31	4.55	3.875	.675
Average	4.455	3.542	.913
1903.			
Jan. 8	4.55	3.875	.675
15	4.68	3.875	.805
22	4.68	3.81	.87
29	4.68	3.69	.99
Feb. 5	4.55	3.625	.925
11	4.55	3.69	.86
19	4.58	3.75	.83
26	4.625	3.75	.875
Mar. 5	4.675	3.78	.895
12	4.675	3.75	.925
19	4.625	3.72	.905
26	4.625	3.625	1.00
Apr. 2	4.55	3.56	.99
9	4.55	3.50	1.05
16	4.675	3.59	1.085
23	4.75	3.69	1.06
30	4.75	3.69	1.06
May 7	4.75	3.69	1.06
14	4.725	3.69	1.035
21	4.725	3.69	1.035
28	4.70	3.625	1.075
June 4	4.70	3.59	1.11
11	4.725	3.59	1.135
18	4.725	3.59	1.135
25	4.725	3.56	1.165
July 2	4.675	3.56	1.115
9	4.675	3.56	1.115
16	4.775	3.69	1.085
23	4.875	3.69	1.185
30	4.875	3.66	1.215
Aug. 6	4.875	3.72	1.155
13	4.775	3.72	1.055
20	4.825	3.81	1.015
27	4.825	3.875	.95
Sept. 3	4.825	3.875	.95
10	4.825	3.875	.95
17	4.775	3.875	.90
24	4.775	3.91	.865
Oct. 1	4.775	3.91	.865
8	4.55	3.85	.70
15	4.55	3.875	.675
22	4.55	3.875	.675
29	4.50	3.875	.625
Nov. 5	4.50	3.81	.69
12	4.50	3.81	.69
19	4.45	3.75	.70
27	4.36	3.75	.61
Dec. 3	4.36	3.69	.67
10	4.36	3.625	.735
17	4.36	3.625	.735
24	4.36	3.56	.80
31	4.31	[1] 3.47	.84
Average	4.638	3.72	.918
1904.			
Jan. 7	4.36	3.47	.89
14	4.36	3.35	1.01
21	4.36	3.31	1.05
28	4.26	3.31	.95
Feb. 4	4.26	3.35	.91
11	4.26	3.35	.91
18	4.26	3.35	.91
25	4.26	3.38	.88
Mar. 3	4.31	3.44	.87
10	4.41	3.44	.97
17	4.50	3.50	1.00
24	4.50	3.60	.90
31	4.50	3.67	.83
Apr. 7	4.50	3.67	.83
14	4.40	3.61	.79
21	4.40	3.54	.86
28	4.55	3.70	.85
May 5	4.55	3.73	.82
12	4.55	3.75	.80
19	4.75	3.88	.87
26	4.80	3.95	.85
June 2	4.80	3.95	.85
9	4.75	3.875	.875

[1] Since Dec. 27, 1903, sugar imported from Cuba has been allowed a concession of 20 per cent and assessed 1.348 cents per pound duty.

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1904.	*Cents.*	*Cents.*	*Cents.*
June 16	4.75	3.84	0.91
23	4.75	3.94	.81
30	4.75	3.94	.81
July 7	4.85	3.94	.91
14	4.85	3.94	.91
21	4.85	3.94	.91
28	4.95	3.94	1.01
Aug. 4	5.00	4.06	.94
11	5.00	4.125	.875
18	4.95	4.25	.70
25	4.95	4.25	.70
Sept. 1	5.00	4.31	.69
8	5.00	4.31	.69
15	4.95	4.31	.64
22	4.95	4.25	.70
29	5.00	4.31	.69
Oct. 6	4.90	4.29	.61
13	4.90	4.25	.65
20	4.80	4.25	.55
27	4.80	4.22	.58
Nov. 3	5.00	4.41	.59
10	5.25	4.41	.84
17	5.30	4.625	.675
23	5.30	4.75	.55
Dec. 1	5.30	4.75	.55
8	5.40	4.75	.65
15	5.50	4.875	.625
22	5.50	4.875	.625
29	5.60	4.875	.725
Average	4.7837	3.9839	.7998
1905.			
Jan. 5	5.70	4.875	0.825
12	5.80	5.06	.74
19	5.90	5.24	.66
26	6.00	5.25	.75
Feb. 2	6.00	5.25	.75
9	5.90	4.94	.96
16	5.90	4.94	.96
23	5.90	5.06	.84
Mar. 2	5.90	5.125	.775
9	5.90	5.06	.84
16	5.90	4.88	1.02
23	5.90	4.84	1.06
30	5.90	4.81	1.09
Apr. 6	5.90	4.94	.96
13	5.90	4.88	1.02
20	5.90	4.72	1.18
27	5.90	4.625	1.275
May 4	5.90	4.625	1.275
May 11	5.70	4.50	1.20
18	5.50	4.34	1.16
25	5.60	4.375	1.225
June 1	5.60	4.375	1.225
8	5.60	4.375	1.225
15	5.60	4.25	1.35
22	5.35	4.31	1.04
29	5.25	4.25	1.00
July 6	5.25	4.19	1.065
13	5.15	4.00	1.155
20	5.05	4.00	1.05
27	4.90	4.06	.84
Aug. 3	5.05	4.06	.99
10	5.10	4.125	.97
17	5.10	4.125	.97
24	5.10	4.00	1.10
31	5.00	4.00	1.00
Sept. 7	5.00	4.00	1.00
14	4.90	3.875	1.025
21	4.65	3.625	1.025
28	4.55	3.69	.86
Oct. 5	4.55	3.61	.94
12	4.55	3.625	.925
19	4.45	3.58	.87
26	4.45	3.50	.95
Nov. 2	4.35	3.50	.85
9	4.35	3.44	.91
16	4.35	3.44	.91
23	4.45	3.55	.90
29	4.45	3.56	.89
Dec. 7	4.45	3.56	.89
14	4.45	3.625	.825
21	4.45	3.625	.825
28	4.45	3.625	.825
Average	5.247	4.267	.98
1906.			
Jan. 4	4.45	3.625	.825
11	4.55	3.75	.70
18	4.35	3.625	.725
25	4.35	3.56	.79
Feb. 1	4.35	3.50	.85
8	4.35	3.36	.99
15	4.30	3.36	.94
21	4.30	3.36	.94
Mar. 1	4.35	3.39	.96
8	4.45	3.44	1.01
15	4.45	3.52	.93
22	4.45	3.56	.89
29	4.45	3.50	.95

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1906.	*Cents.*	*Cents.*	*Cents.*
Apr. 5	4.55	3.55	1.00
12	4.45	3.48	.97
19	4.40	3.42	.98
26	4.30	3.375	.925
May 3	4.40	3.48	.92
10	4.45	3.48	.97
17	4.35	3.42	.93
24	4.35	3.42	.93
31	4.35	3.45	.90
June 7	4.45	3.47	.98
14	4.45	3.50	.95
21	4.45	3.50	.95
28	4.45	3.61	.84
July 5	4.55	3.75	.80
12	4.55	3.72	.83
19	4.45	3.72	.73
26	4.65	3.75	.90
Aug. 2	4.65	3.80	.85
9	4.75	3.875	.875
16	4.75	3.875	.875
23	4.65	3.94	.71
30	4.65	4.00	.65
Sept. 6	4.65	4.00	.65
13	4.75	4.09	.66
20	4.75	4.09	.66
27	4.75	4.06	.69
Oct. 4	4.55	4.00	.55
11	4.65	4.00	.65
18	4.65	4.00	.65
25	4.65	4.00	.65
Nov. 1	4.55	3.88	.67
8	4.55	3.81	.74
15	4.55	3.81	.74
22	4.55	3.81	.74
28	4.55	3.84	.71
Dec. 6	4.62	3.84	.78
13	4.62	3.875	.745
20	4.62	3.875	.745
27	4.62	3.58	1.04
Average	4.516	3.69	.826
1907.			
Jan. 3	4.62	3.56	1.06
10	4.50	3.56	.94
17	4.62	3.50	1.12
24	4.60	3.48	1.12
31	4.65	3.48	1.17
Feb. 7	4.50	3.42	1.08
14	4.55	3.42	1.13
21	4.55	3.38	1.17
28	4.55	3.42	1.13
Mar. 7	4.55	3.51	1.04
14	4.55	3.50	1.05
21	4.55	3.51	1.04
28	4.55	3.58	.97
Apr. 4	4.55	3.61	.94
11	4.65	3.735	.915
18	4.65	3.765	.885
25	4.60	3.73	.87
May 2	4.60	3.765	.835
9	4.70	3.83	.87
16	4.85	3.86	.99
23	4.85	3.92	.93
29	4.85	3.90	.95
June 6	4.85	3.84	1.01
13	4.85	3.73	1.12
20	4.85	3.71	1.14
27	4.85	3.875	.975
July 3	4.85	3.835	1.015
11	4.75	3.835	.915
18	4.75	3.835	.915
25	4.70	3.94	.76
Aug. 1	4.65	3.94	.71
8	4.65	3.94	.71
15	4.65	3.89	.76
22	4.65	3.89	.76
29	4.65	3.92	.73
Sept. 5	4.65	3.92	.73
12	4.65	3.95	.70
19	4.65	3.95	.70
26	4.65	3.95	.70
Oct. 3	4.65	3.95	.70
10	4.65	3.95	.70
17	4.65	3.90	.75
24	4.65	3.90	.75
31	4.65	3.90	.75
Nov. 7	4.65	3.90	.75
14	4.60	3.80	.80
21	4.60	3.70	.90
27	4.60	3.625	.975
Dec. 5	4.55	3.625	.925
12	4.55	3.85	.70
19	4.55	3.85	.70
26	4.55	3.85	.70
Average	4.65	3.753	.897
1908.			
Jan. 2	4.55	3.85	.70
9	4.75	3.94	.81

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1908.	*Cents.*	*Cents.*	*Cents.*
Jan. 16	4.75	3.92	0.83
23	4.75	3.80	.95
30	4.75	3.75	1.00
Feb. 6	4.75	3.75	1.00
13	4.65	3.67	.98
20	4.55	3.67	.88
27	4.65	3.885	.765
Mar. 5	4.75	3.89	.86
12	4.85	4.05	.80
19	5.05	4.125	.92
26	5.25	4.36	.89
Apr. 2	5.25	4.36	.89
9	5.25	4.36	.89
16	5.35	4.36	.995
23	5.35	4.42	.93
30	5.35	4.42	.93
May 7	5.15	4.36	.79
14	5.35	4.36	.99
21	5.35	4.24	1.11
28	5.20	4.27	.93
June 4	5.20	4.36	.84
11	5.20	4.40	.80
18	5.25	4.31	.94
25	5.25	4.25	1.00
July 2	5.25	4.39	.86
9	5.25	4.39	.86
16	5.25	4.36	.89
23	5.25	4.25	1.00
30	5.15	4.25	.90
Aug. 6	5.05	4.125	.925
13	5.05	4.08	.97
20	5.05	4.08	.97
27	4.75	3.90	.85
Sept. 3	4.95	3.96	.99
10	4.95	3.90	1.05
17	4.95	3.95	1.00
24	4.95	3.98	.97
Oct. 1	4.95	3.98	.97
8	4.85	3.98	.87
15	4.85	3.96	.89
22	4.75	4.04	.71
29	4.85	3.98	.87
Nov. 5	4.75	3.95	.80
12	4.60	3.94	.66
19	4.55	3.94	.61
25	4.55	3.94	.61
Dec. 3	4.55	3.92	.63
10	4.55	3.86	.69
17	4.60	3.77	.83
Dec. 23	4.50	3.70	0.80
30	4.50	3.67	.83
Average	4.940	4.064	.876
1909.			
Jan. 7	4.45	3.73	.72
14	4.50	3.73	.77
21	4.50	3.67	.83
28	4.50	3.67	.83
Feb. 4	4.50	3.64	.86
10	4.50	3.61	.89
18	4.30	3.61	.69
25	4.40	3.735	.665
Mar. 4	4.45	3.735	.715
11	4.55	3.80	.75
18	4.70	3.92	.78
25	4.70	3.92	.78
Apr. 1	4.80	3.985	.815
7	4.80	3.985	.815
15	4.80	3.92	.88
22	4.80	3.86	.94
29	4.90	3.92	.98
May 6	4.90	3.86	1.04
13	4.75	3.92	.83
20	4.70	3.95	.75
27	4.80	3.92	.88
June 3	4.80	3.89	.91
10	4.60	3.86	.74
17	4.70	3.92	.78
24	4.75	3.92	.83
July 1	4.70	3.92	.78
8	4.70	3.92	.78
15	4.70	3.92	.78
22	4.70	3.95	.75
29	4.80	3.985	.815
Aug. 5	4.80	4.05	.75
12	4.80	4.08	.72
19	4.80	4.11	.69
26	4.90	4.11	.79
Sept. 2	4.90	4.17	.73
9	4.90	4.20	.70
16	5.00	4.21	.79
23	4.85	4.235	.615
30	4.85	4.235	.615
Oct. 7	4.85	4.235	.615
14	4.90	4.27	.63
21	4.90	4.30	.60
28	4.90	4.30	.60

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1909.	*Cents.*	*Cents.*	*Cents.*
Nov. 4	4.95	4.30	0.65
11	5.00	4.45	.55
18	5.00	4.42	.58
24	5.00	4.36	.64
Dec. 2	5.00	4.33	.67
9	5.00	4.315	.685
16	5.00	4.17	.83
23	4.80	4.02	.78
30	4.80	4.02	.78
Average	4.762	4.005	.757
1910.			
Jan. 6	4.80	4.02	0.78
13	4.90	4.11	.79
20	4.90	4.08	.82
27	4.90	4.08	.82
Feb. 3	4.90	4.17	.73
10	4.90	4.11	.79
17	4.90	4.20	.70
24	5.00	4.36	.64
Mar. 3	5.10	4.39	.71
10	5.20	4.36	.84
17	5.20	4.36	.84
23	5.20	4.36	.84
31	5.10	4.36	.74
Apr. 7	5.10	4.36	.74
14	5.05	4.36	.69
21	5.10	4.30	.80
28	5.10	4.30	.80
May 5	5.10	4.30	.80
12	5.20	4.24	.96
19	5.20	4.24	.96
26	5.20	4.27	.93
June 2	4.95	4.24	.71
9	5.10	4.24	.86
16	5.10	4.17	.93
23	5.10	4.24	.86
30	5.00	4.30	.70
July 7	5.05	4.33	.72
14	5.05	4.30	.75
21	5.10	4.36	.74
28	5.10	4.36	.74
Aug. 4	5.05	4.36	.69
11	5.10	4.39	.71
18	5.10	4.42	.68
25	5.20	4.45	.75
Sept. 1	5.20	4.425	.775
8	5.00	4.36	.64
15	5.00	4.36	.64
Sept. 22	5.00	4.24	0.76
29	5.00	4.05	.95
Oct. 6	4.95	3.95	1.00
13	4.85	3.90	.95
20	4.75	3.85	.90
27	4.70	3.86	.84
Nov. 3	4.55	3.80	.75
10	4.55	3.86	.69
17	4.55	3.90	.65
23	4.55	3.90	.65
Dec. 1	4.55	3.93	.62
8	4.75	4.05	.70
15	4.75	4.00	.75
22	4.75	3.985	.765
29	4.75	3.985	.765
Average	4.966	4.19	.776
1911.			
Jan. 5	4.75	3.86	0.89
12	4.75	3.675	1.075
19	4.60	3.515	1.085
26	4.60	3.42	1.18
Feb. 2	4.55	3.45	1.10
9	4.55	3.48	1.07
16	4.55	3.545	1.005
23	4.55	3.67	.88
Mar. 2	4.55	3.73	.82
9	4.65	3.76	.89
16	4.75	3.83	.92
23	4.75	3.92	.83
30	4.75	3.86	.89
Apr. 6	4.655	3.86	.795
12	4.606	3.86	.746
20	4.802	3.92	.882
27	4.802	3.92	.882
May 4	4.802	3.795	1.007
11	4.802	3.86	.942
18	4.802	3.86	.942
25	4.802	3.86	.942
June 1	4.802	3.86	.942
8	4.90	3.86	1.04
15	4.90	3.89	1.01
22	4.90	3.98	.92
29	4.90	3.98	.92
July 6	4.90	4.05	.85
13	5.047	4.23	.817
20	5.047	4.36	.687
27	5.341	4.61	.731
Aug. 3	5.537	4.61	.927

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1911.	*Cents.*	*Cents.*	*Cents.*
Aug. 10	5.537	4.8675	0.6695
17	5.635	4.92	.715
24	5.831	5.00	.831
31	6.125	5.25	.875
Sept. 7	6.37	5.75	.62
14	6.615	5.75	.865
21	6.615	5.92	.695
28	6.615	5.965	.65
Oct. 5	6.615	5.80	.815
11	6.615	5.96	.655
19	6.615	5.96	.655
26	6.566	5.735	.831
Nov. 2	6.37	5.30	1.07
9	6.174	5.12	1.054
16	6.076	5.12	.956
23	5.978	5.0625	.9155
29	5.88	5.0625	.8175
Dec. 7	5.537	4.9375	.5995
14	5.635	4.875	.76
21	5.635	4.715	.92
28	5.635	4.65	.985
Average	5.345	4.453	.892
1912.			
Jan. 4	5.537	4.42	1.117
11	5.39	4.42	.97
18	5.39	4.45	.94
25	5.194	4.39	.804
Feb. 1	5.194	4.41	.784
8	5.39	4.55	.84
15	5.586	4.735	.851
21	5.584	4.80	.884
29	5.684	4.67	1.014
Mar. 7	5.684	4.52	1.164
14	5.488	4.52	.968
21	5.439	4.42	1.019
28	5.341	4.36	.981
Apr. 3	5.145	4.30	.845
11	5.096	4.11	.986
18	5.096	4.11	.986
25	4.949	3.985	.964
May 2	4.949	4.05	.899
9	4.949	3.985	.964
16	4.90	3.92	.98
23	4.90	3.92	.98
29	4.998	3.985	1.013
June 6	5.096	3.92	1.176
13	4.949	3.92	1.029
20	4.998	3.86	1.138
27	4.851	3.83	1.021
July 3	4.851	3.77	1.081
11	4.851	3.80	1.051
18	4.90	3.985	.915
25	4.90	4.05	.85
Aug. 1	4.90	4.05	.85
8	4.90	4.05	.85
15	4.851	4.05	.80
22	4.90	4.11	.79
29	4.998	4.235	.763
Sept. 5	4.998	4.36	.638
12	4.998	4.36	.638
19	4.998	4.30	.698
26	4.949	4.17	.779
Oct. 3	4.851	4.14	.711
10	4.802	4.11	.692
17	4.802	4.11	.692
24	4.802	4.05	.752
31	4.802	4.05	.752
Nov. 7	4.802	4.05	.752
14	4.802	4.05	.752
21	4.802	4.05	.752
27	4.802	4.05	.752
Dec. 5	4.802	4.05	.752
12	4.802	3.92	.882
19	4.802	3.92	.882
26	4.802	3.92	.882
Average	5.041	4.162	.879
1913.			
Jan. 2	4.802	3.73	1.072
9	4.557	3.48	1.077
16	4.459	3.48	.979
23	4.459	3.48	.979
30	4.214	3.48	.734
Feb 6	4.165	3.48	.685
13	4.214	3.48	.734
20	4.165	3.48	.685
27	4.165	3.51	.655
Mar. 6	4.214	3.54	.674
13	4.214	3.58	.634
19	4.165	3.58	.585
27	4.165	3.48	.685
Apr. 3	4.165	3.45	.715
10	4.067	3.36	.707
17	4.067	3.36	.707
24	4.116	3.39	.726
May 1	4.116	3.39	.726
8	4.116	3.36	.756

TABLE 27.—QUOTATIONS OF RAW SUGAR AND REFINED GRANULATED SUGAR AT NEW YORK, ETC.—Continued.

Dates.	Granulated.	Cuban centrifugals 96° (duty paid).	Margin between raw and refined.
1913.	*Cents.*	*Cents.*	*Cents.*
May 15	4.116	3.30	0.816
22	4.018	3.30	.718
28	4.116	3.33	.786
June 5	4.116	3.33	.786
12	4.116	3.33	.786
19	4.116	3.33	.786
26	4.214	3.36	.854
July 2	4.410	3.48	.93
10	4.410	3.54	.87
17	4.508	3.57	.938
24	4.508	3.54	.968
31	4.508	3.64	.868
Aug. 7	4.606	3.73	.876
14	4.606	3.73	.876
21	4.606	3.73	.876
28	4.606	3.76	.846
Sept. 4	4.508	3.76	.748
11	4.508	3.76	.748
18	4.508	3.73	.778
25	4.606	3.61	.996
Oct. 2	4.361	3.45	.911
9	4.165	3.48	.685
16	4.067	3.48	.587
23	4.165	3.48	.685
30	4.165	3.61	.555
Nov. 6	4.214	3.54	.674
13	4.214	3.64	.574
20	4.214	3.70	.514
26	4.214	3.61	.604
Dec. 4	4.165	3.54	.625
11	4.165	3.54	.625
18	4.116	3.23	.886
24	4.018	3.23	.788
31	3.92	3.23	.69
Average	4.278	3.506	.772
1914.			
Jan. 8	3.92	3.23	.69
15	3.92	3.29	.63
22	3.92	3.355	.565
29	3.92	3.48	.44
Feb. 5	3.92	3.48	.44
11	3.92	3.48	.44
19	3.92	3.42	.50
Feb. 26	3.92	3.39	0.53
Mar. 5[1]	3.92	3.01	.91
12	3.822	2.95	.872
19	3.773	3.01	.763
26	3.773	2.95	.823
Apr. 2	3.773	2.95	.823
8	3.675	2.92	.755
16	3.675	2.98	.695
23	3.735	3.01	.725
30	3.735	3.04	.695
May 7	3.832	3.14	.692
14	3.92	3.20	.72
21	4.018	3.32	.698
28	4.116	3.39	.726
June 4	4.116	3.32	.796
11	4.116	3.32	.796
18	4.214	3.39	.824
25	4.214	3.32	.894
July 2	4.214	3.32	.894
9	4.214	3.26	.954
16	4.214	3.26	.954
23	4.214	3.26	.954
30	4.165	3.29	.875
Aug. 6	4.90	4.26	.64
13	6.86	6.52	.34
20	7.35	6.00	1.35
27	6.86	6.02	.84
Sept. 3	6.86	6.01	.85
10	7.105	6.27	.835
17	7.105	5.89	1.215
24	6.125	5.02	1.105
Oct. 1	6.37	5.01	1.36
8	6.125	5.02	1.105
15	5.88	4.51	1.37
22	5.782	4.26	1.522
29	5.488	3.64	1.848
Nov. 5	4.90	3.45	1.45
12	4.90	4.07	.83
19	4.998	4.01	.988
25	4.998	4.04	.958
Dec. 3	4.90	3.95	.95
10	4.90	3.89	1.01
17	4.753	3.95	.803
23	4.753	4.01	.743
30	4.851	4.01	.841

[1] Full duty on Cuban 96° sugar from Mar. 1, 1914, is 1.0048 cents per pound. Refined sugars will pay duty according to polariscopic test.

CHAPTER V.

INVESTMENT, CAPITALIZATION, AND EARNINGS OF BEET-SUGAR COMPANIES.

Section 1. Investment and capitalization.

The books of 38 beet-sugar companies were examined in 1914, and adequate financial statements were secured from 37. These 37 companies owned the factories that produced 98.6 per cent of all the sugar produced in the United States.

In determining the net investment no allowance has been made for good will. In every case the exact cost of building, machinery, and other equipment was ascertained as nearly as possible, and this amount was added to the net current assets to arrive at the total net investment. The net current assets consist of the difference between the amount of inventories, bills and accounts receivable, and cash and the amount of bills and accounts payable. The method of ascertaining the cost of buildings and equipment has already been described in the discussion of depreciation (see p. 67). The value of inventories covering granulated sugar and supplies were generally accepted as stated in the books of the companies, and the book entries for cash, bills, accounts, sugar in process, etc., were likewise accepted.

COMPARISON OF COST OF INVESTMENT WITH CAPITAL LIABILITIES.—The aggregate outstanding capital stock of the 37 companies considered in this discussion at the close of the fiscal year ending nearest March 1, 1914, was $114,930,622, and these companies had in addition bond and mortgage indebtedness aggregating $10,596,258, or total capital liabilities of $125,526,880. The aggregate net investment shown by the books of the companies was $115,947,775. It thus appears that these 37 companies taken collectively were overcapitalized to the extent of $9,579,105, or 8.3 per cent.

Taken individually, however, some of these companies were undercapitalized, while others were much more heavily overcapitalized than the 37 companies taken as a whole. Table 28 below shows the relation between the capital liabilities and net investment for the individual companies. The amounts of investment and capital are not shown in this comparison because the use of the absolute figures might identify some of the companies. Since such identification would probably serve no useful purpose and might possibly em-

barrass some concerns only percentages are used to show the extent to which overcapitalization or undercapitalization exists. The relation of investment to capital liabilities for the 37 companies is shown as of the close of the fiscal year ending nearest March 1, 1910, and the fiscal year ending nearest the same date in 1914.

TABLE 28.—PERCENTAGE OF OVERCAPITALIZATION OR UNDERCAPITALIZATION OF BEET-SUGAR COMPANIES AT THE END OF THE YEARS 1909-10 AND 1913—14.

Company number.	1909-10		1913-14		Company number.	1909-10		1913-14	
	Over-capitalization.	Under-capitalization.	Over-capitalization.	Under-capitalization.		Over-capitalization.	Under-capitalization.	Over-capitalization.	Under-capitalization.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	.....	9.48	40.54	.....	20	85.97	.....	129.95	.....
2	.....	29.04	13.95	.....	21	95.81	.....	41.65	.....
3	31.62	.....	178.34	.....	22	.....	39.79	.....	15.03
4	.....	20.32	.....	26.74	23	(1)	(1)	.....	.70
5	37.34	.....	54.50	.....	24	.....	.31	.....	22.07
6	.....	18.60	66.52	.....	25	.....	51.08	.....	43.31
7	.....	35.93	1,972.51	.....	26	.....	52.41	.....	60.10
8	(1)	(1)	16.63	.....	27	72.02	.....	71.42	.....
9	.....	11.08	2.86	.....	28	(1)	(1)	74.95	.....
10	.....	16.78	7.70	.....	29	.....	5.54	1.94	.....
11	(1)	(1)	9.29	.....	30	26.90	.....	.....	15.53
12	.....	70.06	.....	78.99	31	(1)	(1)	147.20	.....
13	.....	6.07	8.24	.....	32	(1)	(1)	.....	20.61
14	35.07	.....	106.84	.....	33	(1)	(1)	84.37	.....
15	(1)	(1)	94.85	.....	34	.....	14.30	.....	43.51
16	.....	36.48	.....	27.59	35	129.82	.....	145.57	.....
17	84.79	.....	79.85	.....	36	.....	26.74	.....	30.88
18	.....	17.65	.....	20.68	37	.....	34.83	.....	10.43
19	125.47	.....	60.68	.....					

[1] Organized since 1909.

The second column in the table shows the relation of capital to investment for each company at the close of the year 1909–10, except, of course, for the eight companies that were organized after 1909. The net assets of companies organized prior to that year have been adjusted from the time of their organization, in order to arrive at a proper figure for this year. The third column of the table shows the corresponding relation for the year 1913–14. The figures for the three years intervening between 1909–10 and 1913–14 are not given, because the important figure is that relating to the latest year, while the data for 1909–10 are shown merely to indicate the changes during the five years.

From the above table it is seen that in 1913–14 14 companies had capital liabilities less than the cost of their net assets. Some of these 14 companies, however, were overcapitalized in the beginning. The other 23 companies had capital liabilities greater than the cost of

their net assets, and the excess measures their overcapitalization. In the present discussion the cost of investment, as distinguished from its present value, is considered.

At the beginning of the period covered by the table some of the companies were overcapitalized, but during the intervening years they increased their assets or diminished their capital liabilities, or both, until in 1913–14 they were undercapitalized. On the other hand, some of the companies shown in the table were not overcapitalized at the beginning of this period, but subsequently they either dissipated their assets or increased their capital stock and bonds without adding anything to their assets, so that they were overcapitalized in 1913–14.

The above points may be made clearer by citing two examples. Thus, when company No. 24 began business it was overcapitalized more than 55 per cent, but since then it has earned enough to pay dividends on its outstanding stock and to add to its assets, so that if its property had been sold at the end of 1913–14 for what it cost, the proceeds would have redeemed all its stock at par and left $22 for each $100 share. In the case of company No. 10, the net assets exceeded the capital liabilities by nearly $17 per share at the close of the year 1909–10. During the four years, however, its net assets diminished until its capital stock exceeded its net property by $7.70 per share. Thus, if this company's assets had been sold at cost at the end of 1913–14 it would have lacked, after paying its debts, more than $7 per share of having enough to redeem its stock at par.

The most striking fact disclosed by the table is the great extent to which some companies are overcapitalized. Of the 23 overcapitalized companies in 1914, 6 had a capitalization in excess of the cost of their net assets of more than 100 per cent, and the capital liabilities of one company was 20 times the cost of its net assets. As already stated, overcapitalization in some cases is due to losses in the business and not to excessive stock issues at the time of organization. Only a few years ago the company just referred to as being highly overcapitalized was undercapitalized to the extent of about 35 per cent, but in recent years it has incurred heavy losses and thereby almost entirely dissipated its assets. In this particular case the holders of the stock have abundant means and they have individually loaned money to the company to meet its current obligations. This is also true of one or two other companies.

The capital liabilities of most of the companies consist of both stocks and bonds. In case of liquidation the bonds would have to be paid off before the stockholders would be entitled to anything. Assuming that the 37 companies in the foregoing table could dispose of

their assets at cost, 14 of them would be able to pay all their current indebtedness, retire their bonds, and have left more than enough to redeem all of their stock at par. Under these circumstances the other 23 companies would not be able to return to stockholders the par value of their stock. A statement showing the amount available for each $100 of outstanding stock after paying current debts and retiring its bonds is given below. The companies have been arranged in descending order according to the book value of net assets for each $100 of capital stock.

Company No.	Assets available for each $100 share of stock.	Company No.	Assets available for each $100 share of stock.	Company No.	Assets available for each $100 share of stock.	Company No.	Assets available for each $100 share of stock.
12	$475.97	30	$118.73	8	$79.07	35	$36.20
26	250.64	22	117.69	21	67.54	3	35.93
24	183.19	37	111.65	5	64.73	14	34.57
25	176.41	23	101.09	1	62.65	15	32.68
36	158.09	29	96.86	19	62.24	20	27.95
16	146.36	9	96.07	6	60.05	27	27.21
4	136.50	10	92.85	28	56.73	7	4.83
32	133.14	13	90.50	17	47.99		
24	128.32	11	84.14	33	44.91		
18	126.07	2	79.28	31	40.45		

The above statement brings out clearly the status of the stock in each of the companies, but it takes no account of possible depreciation of the property or increase in the value of assets. Furthermore, the lack of sufficient assets to cover stock at par does not necessarily mean that in case of the liquidation of a company the stockholders would lose. This might be so if they had paid more for their stock than the books of the companies indicated it to be worth. For example, if all the stockholders of company 6 paid par for their stock, each of them would stand to lose $40 on each $100 share in case of liquidation, unless net assets were worth more than their book value. On the other hand, if the stock of this company had been acquired by a holder at a discount of 40 per cent, then in case of liquidation he would lose practically nothing, since the company presumably has at least $60 available for the redemption of each $100 share of stock.

A number of the overcapitalized companies have been able to earn and pay dividends upon all their stock. Overcapitalization, therefore, does not necessarily imply unsuccessful business. Two among the largest beet-sugar corporations in the country are considerably overcapitalized, neither one of them having a cost of assets

equal to 65 per cent of its capital stock. Some of the more extensively overcapitalized companies, however, have not been successful, and their present poor showing of net assets as compared with outstanding stock is largely due to losses in business.

Section 2. Relations of earnings to capital employed.

In the discussion of the relation of capital obligations to investment, comparisons were based on net assets as determined by their cost. In order to determine the rate of profit in any business the usual method which is generally satisfactory is to compare the net earnings with the net assets. A comparison of the rate of earnings on this basis, however, would not be entirely satisfactory for the companies here under consideration because the net assets of some concerns are less than the capital actually employed in the business, while in others it is more. Certain companies have large surpluses which are not used in their business at all. It is evident that if the rate of profit on the sugar business is the question to be determined, such surpluses, which are often invested in other lines of business, should be excluded in computing the capital employed in the sugar business. On the other hand, certain companies which have been particularly unfortunate have no current assets, their current payables exceeding the sum of their inventories, receivables, and cash. Consequently, the profit or loss of their business would be related to a net investment less than the value of their plants. In such cases it is necessary, in order to show what was earned on the capital actually employed in the sugar business, to disregard the net assets and to take plant and plant site, materials and supplies, and a reasonable amount for additional working capital. According to this method of treatment, the rate of loss in companies which have suffered heavy reverses and have borrowed relatively large amounts on current notes appear less abnormal than they would if the computations were made on the basis of net assets. Furthermore, this method gives a fairer view of the relation of profit and loss to the capital actually employed, because it is obvious that not only plant and inventory but additional working capital to finance the purchase of material and to pay for labor are necessary.

In the following discussion of the rate of profit in the beet sugar industry, both methods are used, namely, net assets and estimated capital actually employed. In the former case, however, such part of the assets as are not invested in the beet sugar business are excluded as well as any returns from such outside investment. The results in the aggregate for all the companies show, however, that it makes little difference which method is used, the chief difference is

in the results of certain individual companies whose financial conditions were of an exceptional character. When the second method was used, it was necessary to determine the amount of working capital that seemed necessary to conduct the business. This should be sufficient to purchase material and supplies to meet pay roll and other expenses until the sales of sugar will take care of operating expenses. The relation of working to total capital or to total value of product varies in different industries. In some it is comparatively small because the money used in the business is turned over rapidly. In others it is large because the capital is turned over not more than once or twice in a year.

On account of the peculiar nature of the beet-sugar industry, working capital is not turned over in a short period and it is therefore necessarily large in proportion to the total. A beet-sugar factory operates only about three months in a year. This fact also raises the ratio between the necessary working capital and the total value of the products. Beets constitute a large item in the total cost of sugar. These must be paid for practically within the short operating period. This principle applies likewise to most other operating expenses, particularly labor and supplies. Returns from the sale of the product probably do not amount to very much within the first 20 or 30 days of operation. Hence, from about a fourth to one-third of the total operating expenses must be borne before there is any return. On the other hand, it must be considered that while the fixed capital can not be used during a large part of the year, the amount required for working capital may be loaned out when not needed for operating the beet-sugar business or for carrying stocks of sugar.

It is difficult to determine just what should be allowed for working capital and consequently what should be considered adequate capital employed as a whole. It would seem that half of the cost of production for a season is an ample allowance for this item, and this basis has been adopted in the following computations.

EARNINGS IN THE SUGAR BUSINESS.—A part of the capital of some companies is employed in other ways than in the manufacture of sugar, such as farming. It thus became necessary to segregate the capital employed in the sugar business from the total employed in all business for those companies that had other interests. It was not necessary to make a similar adjustment for earnings because the earnings on sugar were always separately shown in the books. It was necessary, however, to make some adjustment in both capital employed and earnings when depreciation was taken into account. The net cost of depreciable property was diminished by the amount of depreciation computed according to the method already explained and the earnings of the companies were likewise diminished.

The purpose here is to show what capital is employed in the beet-sugar business and what it has earned. The segregation of the sugar manufacturing business from the total business of some of these companies discloses the fact that while some have lost money upon their aggregate business, upon their sugar business they have had a profit. Their farming operations have frequently shown losses, and where profits have been earned at all they were usually small. It would be misleading to judge the results from manufacturing beet sugar if those results were in any way modified by profits or losses in farming or in any other business.

Section 3. Rates of earnings on capital employed.

The amount of capital employed by each of the 37 companies for which data were secured has been determined according to the method described. Of these 37 companies, 2 operated only 3 years during the period covered, 4 operated only 2 years, and 2 operated only 1 year. These 8 companies have not been included in the main table of earnings because to do so might disclose their identity. Separate lines at the bottom of the table show the earnings of the 8 companies that operated less than 5 years and the earnings of all the 37 companies.

The actual amount of capital employed and the actual amount of earnings are not shown for any company. To disclose these amounts might possibly identify some concern, and for this reason only the rate of earnings is shown. These earnings represent the difference between what it cost to produce and to market the sugar and what it sold for net. The period covered is the 5 years from 1909–10 to 1913–14. For convenience in showing readily the effect of depreciation upon earnings, two computations have been made, one excluding depreciation, and the other including it. The results of both computations are shown in parallel columns in Table 29 following.

TABLE 29.—RATES OF EARNINGS ON CAPITAL EMPLOYED, TAKING ACCOUNT OF DEPRECIATION, IN THE MANUFACTURE OF BEET SUGAR, ALLOWING ONE-HALF OF THE TOTAL COST OF PRODUCTION FOR WORKING CAPITAL, BY YEARS, AND AVERAGES FOR 5 YEARS, 1909-10 TO 1913-14, INCLUSIVE.

Company No.	Not including depreciation.						Including depreciation.					
	1909-10	1910-11	1911-12	1912-13	1913-14	Average for 5 years.	1909-10	1910-11	1911-12	1912-13	1913-14	Average for 5 years.
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
1	17.2	12.5	2.1	3.0	4.7	6.6	18.7	12.8	[1] 1.1	[1] 1.0	1.3	4.2
2	14.3	3.8	[1] 7.4	2.0	2.1	1.5	20.7	8.9	[1] 19.7	[1] 2.3	[1] 2.2	[1] 3.3
3	[1] 9.1	[1] 3.6	[1] 6.1	6.0	[1] 9.0	[1] 4.0	[1] 14.9	[1] 7.9	[1] 10.8	3.5	[1] 16.3	[1] 8.8
4	9.2	1.3	10.7	7.1	4.8	6.7	7.2	[1] 3.8	10.4	5.2	1.6	4.4
5	23.8	15.0	8.6	2.1	10.9	11.6	23.4	14.0	6.7	[1] 1.7	9.7	10.1
6	6.8	5.5	11.0	4.5	[1] 6.5	3.7	3.4	1.9	9.4	1.7	[1] 13.2	.2
7	15.0	7.6	[1] 36.6	[1] 23.3	[1] 8.6	[1] 10.9	14.1	5.4	[1] 47.8	[1] 35.5	[1] 16.9	[1] 17.8
9	10.0	6.5	[1] 1.3	[1] 4.1	2.0	2.3	8.5	4.4	[1] 5.6	[1] 10.5	[1] 2.2	[1] 1.3
10	4.1	2.5	[1] 22.8	6.3	[1] .3	[1] 2.6	0.0	[1] 1.9	[1] 35.5	3.7	[1] 7.6	[1] 9.2
12	30.7	18.7	6.4	4.0	9.4	13.5	31.5	18.1	3.9	.3	7.8	12.4
13	14.1	7.4	[1] 3.5	3.1	[1] 1.3	3.5	14.3	5.7	[1] 8.3	[1] .2	[1] 7.5	.4
14	5.7	1.0	[1] 10.0	[1] 5.6	[1] 3.6	[1] 3.1	2.2	[1] 3.0	[1] 15.1	[1] 11.2	[1] 10.3	[1] 8.0
16	21.3	11.0	10.2	3.6	4.7	8.4	20.5	8.6	8.0	0.0	1.2	5.7
17	2.7	2.4	4.3	3.4	[1] 7.2	1.2	[1] 1.3	[1] 1.8	1.6	0.0	[1] 17.2	[1] 3.2
18	23.2	25.0	25.4	26.5	4.3	20.4	26.7	30.9	32.5	33.2	1.6	24.4
19	16.3	22.1	23.2	9.3	7.6	15.4	18.5	27.8	30.2	9.2	6.7	18.3
20	8.6	11.5	3.0	4.0	[1] 8.0	3.8	5.6	9.4	[1] 1.5	.3	[1] 17.3	[1] .2
21	7.8	5.4	11.5	8.3	6.2	7.9	4.8	2.2	9.3	5.9	3.5	5.3
22	8.7	18.5	24.4	8.8	[1] 7.2	10.2	7.5	22.1	31.1	8.2	[1] 17.0	10.2
24	22.6	13.4	26.2	15.3	6.5	16.2	22.6	11.9	28.6	15.4	4.6	16.0
25	24.1	19.2	30.4	26.1	9.0	21.5	24.5	19.5	34.4	30.0	7.8	23.2
26	50.2	47.7	50.2	25.1	5.8	35.2	63.4	60.2	64.2	31.6	4.0	44.8
27	3.9	2.3	12.9	13.4	6.0	7.7	.1	[1] 2.3	12.7	14.1	3.2	5.4
29	6.6	16.4	16.1	17.9	8.8	13.4	3.3	14.8	15.2	18.0	6.8	11.8
30	14.1	12.2	18.9	12.0	7.2	12.7	14.2	12.1	22.2	12.6	5.4	13.3
34	19.2	19.1	19.9	5.6	2.5	12.0	16.2	16.7	17.9	2.4	[1] 1.1	9.3
35	5.5	4.2	5.3	[1] 11.3	[1] 5.4	[1] .8	1.3	0.0	1.2	[1] 19.4	[1] 12.7	[1] 6.1
36	7.5	25.3	20.4	18.9	18.9	18.3	4.6	23.8	19.1	18.0	18.7	16.7
37	26.9	29.5	32.2	32.1	16.7	27.3	30.0	34.1	38.7	40.1	19.2	32.4
29 companies operating 5 years	16.6	14.7	15.3	10.1	6.1	12.2	16.3	14.4	15.6	9.0	3.7	11.6
8 companies operating less than 5 years	.....	.....	[2] 15.9	[3] 6.3	[4] 1.2	[4] 4.7	.....	.....	[2] 12.8	[3] 2.8	[4] 2.6	[4] 1.3
Total, all companies	16.6	14.7	15.3	9.8	5.7	12.0	16.3	14.4	15.5	8.6	3.1	11.2

[1] Loss. [2] Two companies. [3] Six companies. [4] Eight companies.

The 29 companies included in the body of the foregoing table produced 5,753,021,000 pounds of sugar in the 5 years covered by this report, which was 95 per cent of all the beet sugar manufactured in the United States during that period. The average annual rate of earnings for these 29 companies during the period covered, after

taking account of depreciation, was 11.6 per cent. This was only six-tenths of 1 per cent less than the average earnings when depreciation was not taken into account. It should be noted that in the year 1909–10 only one company showed a loss, while in 1913–14 10 companies showed a loss without taking depreciation into account, and 13 showed losses when depreciation is considered. The highest average rate of earnings in any year, after deducting depreciation, was 16.3 per cent in 1909–10, and the lowest was 3.7 per cent in 1913–14. In no other year did the earnings fall below 9 per cent. Even in the poorest year of the period (1913–14) each of the 7 companies producing 29 per cent of the total product for that year, earned over 6 per cent, and each of the 9 companies producing 69 per cent of the total product earned over 4½ per cent of its capital.

The heavy losses of the few companies in 1911–12 were due to their inability to work up all the beets they purchased before they spoiled, and their losses on this account were very heavy. These companies all operated in the Lake States. Company No. 7, after allowing for depreciation, lost nearly 48 per cent of the capital it had employed in its business in that year. This company borrowed money to continue its business, and again in the next year lost more than one-third of the capital it had employed, and in the next year again it resorted to borrowing and lost nearly 17 per cent.

Company No. 26 showed the best results, it having earned an average of nearly 45 per cent on its capital employed during the 5-year period. Twelve companies had average earnings of more than 10 per cent during the period. The poorest results are shown for factory No. 7, which showed an average loss of nearly 18 per cent for the period. At the beginning of the period this company earned 14 per cent, but it had very heavy losses in 1911 and in 1912.

The low average earnings in 1913–14 were due mainly to a slump in the price of granulated sugar. The average net price in 1913–14 was about 96 cents per 100 pounds less than was realized the year before and more than $1 per 100 pounds less than for any other year in the 5-year period under consideration.

It will be noted that some companies show a higher rate of earnings after deducting depreciation than they do when depreciation is not taken into account. This is true of companies 25 and 26 throughout the entire period except in 1913–14. This apparent inconsistency is due to the fact that accumulated depreciations prior to 1909 had greatly reduced net investment in depreciable property. For example, the depreciable property of company No. 26 cost approximately $433,000 when it began business in 1899. By 1909 additions to the plant had been made until the cost was $501,000. In the meantime, however, depreciation had accrued until at the be-

ginning of 1909 this amounted to $229,000, and the actual net cost of depreciable property was, therefore, reduced to $272,000. Only those companies that have been in operation a comparatively long period of years and which had made comparatively small additions to their investment would show any such results. The earnings of companies that began business only a few years prior to 1909, and which have since then made considerable additions to their depreciable property are of course not similarly affected by making deductions for depreciation. Generally the effect of the depreciation charge is to reduce the average rate of earnings during the 5-year period.

RATES OF EARNINGS BY GROUPS OF COMPANIES.—A fuller significance of the rates of earnings in the industry as a whole will be seen from a grouping of the companies according to their earnings and according to the percentage of the total sugar they produced. As already stated, 29 companies included in the body of Table 29 produced 95 per cent of all the beet sugar made in the United States during the 5 years ending with the campaign 1913–14. In the statement below the 29 companies have been grouped according to their rates of earnings, after deducting depreciation, and it shows what percentage of all the sugar produced by these 29 companies and of all the sugar produced in the United States was produced by each group:

Group.	Number of companies.	Rate of earnings.	Per cent of production of 29 companies.	Per cent of total production in United States.
Group I	16	Over 5 per cent	86	82
Group II	13	Over 9 per cent	78	75
Group III	7	Over 16 per cent	56	53
Group IV	13	Less than 5 per cent	14	13½
Group V	9	Loss	10	9½

The earnings shown in the above groups are net after making deductions for depreciation. It is worthy of note that the 13 companies earning less than 5 per cent during the period produced only 13½ per cent of the total production of the country. None of the companies in this group earned as much as 4½ per cent, and 9 of them operated at an absolute loss. It should also be particularly noted that the companies producing 78 per cent of the production of the 29 companies and 75 per cent of the total production of the United States earned an average of more than 9 per cent on the capital employed during the five-year period.

Section 4. Rates of earnings on net investment.

The earnings shown and discussed in the preceding section are net on the capital actually employed in the business regardless of whether it was owned or borrowed and after depreciation has been deducted. The annual rates of earnings on net investment, computed in the usual way, differ slightly from those in Table 29. Such a statement of earnings is shown in Table 30 below.

TABLE 30.—ANNUAL RATES OF EARNINGS FROM SUGAR ON NET INVESTMENT IN THE SUGAR BUSINESS, BY COMPANIES, 1909-10 TO 1913-14, AND THE AVERAGE ANNUAL RATE OF EARNINGS FOR THE 5 YEARS.

[NOTE.—No company operating less than 5 years is included in this table.]

Company No.	Not including depreciation.						Including depreciation.					
	1909-10	1910-11	1911-12	1912-13	1913-14	Average, 5 years.	1909-10	1910-11	1911-12	1912-13	1913-14	Average, 5 years.
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
1	18.2	14.7	2.2	3.6	5.7	7.7	20.3	16.2	[1] 1.3	[1] 1.3	1.7	5.1
2	15.0	4.7	[1] 9.8	2.6	2.9	1.9	22.5	1.3	[1] 37.1	[1] 4.3	[1] 4.1	[1] 5.5
3	[1] 10.8	[1] 4.8	[1] 8.4	8.1	[1] 11.3	[1] 5.2	[1] 18.3	[1] 11.1	[1] 16.1	5.2	[1] 22.3	[1] 12.2
4	9.0	1.5	11.9	7.2	5.0	7.0	7.1	4.3	12.1	5.2	1.7	4.7
5	23.0	15.8	10.5	2.5	12.0	12.8	22.6	14.9	8.4	[1] 2.1	11.1	11.4
6	7.1	5.4	11.0	5.6	[1] 9.4	4.2	3.6	1.9	9.4	2.2	[1] 21.9	.2
7	16.1	8.2	[1] 48.7	[1] 33.4	[1] 10.3	[1] 13.2	15.4	5.9	[1] 68.7	[1] 59.6	[1] 21.9	[1] 23.0
9	13.2	9.2	[1] 1.8	[1] 5.5	2.5	3.1	12.4	7.1	[1] 8.3	[1] 16.3	[1] 3.2	[1] 1.9
10	4.5	2.8	[1] 24.3	7.9	[1] .3	[1] 2.9	.0	[1] 2.2	38.8	5.2	[1] 9.2	[1] 10.9
12	36.0	23.9	7.9	3.5	8.3	14.4	37.9	24.2	5.1	.2	6.6	13.5
13	15.3	9.2	[1] 5.6	3.2	[1] 1.6	4.3	16.0	7.8	[1] 16.6	[1] .2	[1] 10.5	.5
14	6.1	1.2	[1] 14.3	[1] 7.1	[1] 4.1	[1] 3.8	2.3	[1] 3.8	[1] 23.0	[1] 15.1	[1] 12.4	[1] 10.2
16	21.6	14.0	13.8	4.7	5.3	10.3	20.8	11.3	11.5	[1] .1	1.4	7.2
17	3.1	2.9	6.2	4.8	[1] 9.4	1.6	[1] 1.6	[1] 2.3	2.6	.1	[1] 27.1	[1] 4.6
18	14.8	13.8	17.3	18.7	3.2	13.5	15.3	14.3	19.3	20.8	1.0	14.2
19	21.8	25.1	25.0	10.2	8.8	17.7	27.2	32.3	32.5	10.3	8.1	21.8
20	9.0	11.5	2.8	4.1	[1] 7.8	3.7	5.9	9.4	[1] 1.4	.3	[1] 16.6	.2
21	7.9	5.7	12.3	10.0	7.2	8.8	4.9	2.4	10.1	7.5	4.3	6.1
22	8.8	19.3	24.0	8.5	[1] 8.6	10.6	7.6	23.5	30.4	7.8	[1] 22.9	10.8
24	17.9	10.2	19.0	12.4	5.5	12.8	17.2	8.7	19.4	11.9	3.7	12.1
25	18.9	12.8	19.5	15.0	5.4	13.9	18.6	12.0	2.0	15.2	4.1	13.6
26	46.4	39.7	41.0	20.1	5.4	30.1	57.1	47.4	4.9	23.3	3.6	36.3
27	4.2	2.3	11.8	11.8	5.4	7.4	.1	[1] 2.4	11.2	11.8	2.8	5.0
29	6.2	20.9	14.7	20.6	9.2	14.0	3.0	19.6	13.5	21.4	7.2	12.5
30	14.7	12.2	19.3	11.1	7.1	12.6	15.1	12.2	22.9	11.3	5.3	13.1
34	20.1	21.8	24.0	5.9	2.8	13.3	17.1	19.2	22.1	2.5	[1] 1.3	10.5
35	5.1	3.8	5.3	[1] 11.4	[1] 6.0	[1] .8	1.2	.0	1.3	[1] 19.6	[1] 14.7	[1] 6.0
36	6.5	23.6	17.9	14.8	14.9	15.5	3.9	22.0	16.6	13.7	14.2	14.0
37	27.0	28.6	32.9	34.0	16.4	27.5	30.1	32.7	39.9	43.4	18.7	32.7
Average for 29 companies	16.0	14.2	14.9	9.9	6.0	11.9	15.5	13.6	15.0	8.7	3.6	11.2

[1] Loss.

The average rate of earnings from sugar on the net investment for the 29 companies for the five years, after deducting depreciation, is only four-tenths of 1 per cent less than the average rate on the capital employed. The difference in the earnings computed on this basis and on the basis used in Table 29, after taking depreciation into account, is less than 1 per cent in each year during the period.

CHAPTER VI.

EFFICIENCY IN THE BEET-SUGAR INDUSTRY.

Section 1. Principal elements to consider in studying efficiency.

Speaking broadly, efficiency in production means the degree of cheapness with which an article can be produced and sold. In this broad sense every element of cost must be included. In a narrower sense productive efficiency refers to the cheapness with which mechanical processes can be performed. In a practical sense efficiency is only relative; that is to say, a factory in any industry is efficient or inefficient only as compared with some other factory or with some recognized standard. A fair basis of comparison is the average results of several well-equipped, well-located, and well-managed plants with the results of plants not so well located or so well equipped and managed. This would seem to be more reasonable than to adopt as a standard the results of the best factory in an industry. Such a factory would indicate the possibilities under the most favorable conditions, but it would not indicate probabilities under ordinarily favorable conditions.

The elements of efficiency may be grouped into two classes, namely, mechanical and economic. Or, to put it another way, it may be said that there are two phases of efficiency, namely, factory efficiency and business efficiency. A factory may be mechanically efficient and yet utterly fail. Its conversion of raw materials into the finished product may be at the lowest possible cost, but if on account of location or for other reasons its raw material has cost too much or if the expense of distributing its product is excessive, it can not succeed. On the other hand, a manufacturing plant may be situated to the best possible advantage, but if it is equipped with poor machinery, or even with good machinery badly arranged, it is apt to fail.

MECHANICAL ELEMENTS.—The principal mechanical elements involved in a study of efficiency are equipment and organization. By equipment is meant the kind of appliances, machinery, and processes used; by organization is meant the adaptation of buildings to the purposes for which they are used and the arrangement and coordination of appliances and machinery. In respect to mechanical equipment and organization, three comparisons are important. The first

is a comparison of factories of substantially like equipment and equal capacity; the second is a comparison of factories with like equipment and organization, but of unequal capacity; the third is a comparison of factories of equal capacity and similar organization, but with unlike equipments. The first is practically a comparison of organization and arrangement of machinery. The second resolves itself into a comparison of large and small scale operations.

It is this second comparison that is now receiving attention from business men and economists. The third comparison is a test of the merits of different appliances, machines, or processes.

Exact comparisons under all of these different circumstances require that the raw material used and the manufactured product turned out shall be substantially identical in character, condition, and quality. Identical raw material becomes especially important where, as in the case of the beet-sugar industry, it constitutes a very large percentage of the total cost. It is obvious therefore that a wide variation in the quality of beets makes impossible any exact comparison of the general efficiency of beet-sugar factories even though all the other elements are favorable. Strictly speaking, factory efficiency need not take account of anything except equipment and organization. Therefore, if the same quality of beets were used in the factories compared, the element of raw material could be entirely eliminated in arriving at relative factory efficiency. This, however, is not the case, and here lies difficulty in a study of efficiencv in this industry.

ECONOMIC ELEMENTS TO BE CONSIDERED.—The most important economic elements are location of plant, distribution of product, and business management. From the standpoint of business success, which is the final test, the economic elements in the beet-sugar industry are perhaps of greatest importance. Some of the best-equipped sugar factories in the country have been unsuccessful because of bad location in respect to raw materials. Others have failed because of bad business judgment in the construction of plants, or other matters.

DIFFICULTIES IN A COMPARATIVE STUDY OF EFFICIENCY IN BEET-SUGAR FACTORIES.—Similarity in the fundamental elements necessary to exact comparisons of efficiency in the beet-sugar industry are seldom if ever found. In fact, there is such a lack of harmony among these elements, as found in various factories, as to compel all comparisons to be more or less general. In the first place, as already pointed out, there is a wide variation in the quality of beets used in different factories and sometimes a wide variation of the quality used in the same factory in different years. The value of beets depends upon the quantity of sugar they contain and the purity of the sugar content. These elements vary widely. Some beets test

18 or 20 per cent sugar, while others test not over half as much. The purity of the beets as worked in factories ranges from as low as 77 to above 88 per cent. Upon these elements depends the possible quantity of sugar that can be extracted. On account of variation in the quality of beets, sugar extraction varies from only about 200 pounds of sugar per ton of beets in some factories for some years to over 300 pounds in others. While this variation in the principal raw material does not preclude a comparison of factory efficiency, it does affect its exactness. This is so because the cost of working beets of high quality differs from the cost of working low-quality beets.

A peculiar feature of the beet-sugar industry is the fact that no factory can operate more than a few months in each year. The reason for this has been explained (see p. 2). The length of time that a factory can be operated depends upon the quantity of available fresh beets and varies from less than two months to sometimes as much as four months. The average is less than three months. This variation in periods of operation disturbs fair comparisons of mechanical efficiency. This is so because certain fixed charges and some charges for labor do not stop when the factory closes, and all must be charged to the sugar produced. Of course the shorter the time of operation the less the quantity of sugar produced and the greater are the fixed charges per 100 pounds. Furthermore, certain factory employees are retained the entire year and a part of the time they are not profitably engaged. Thus the element of labor cost is proportionately increased by a short period of operation.

In spite of these difficulties, however, some valuable comparisons can be made. From the mass of data secured it is possible to compare groups of factories having low manufacturing costs with other groups having high costs. It is also possible to compare the results of large plants with those of small ones.

Probably the surest test of an efficient factory is the percentage of sugar lost in the course of manufacture, or to put it another way, the percentage of available sugar that is saved. Comparisons of economic efficiency are more easily made. It is easy to demonstrate that some factories are badly located and that no matter how efficient they may be mechanically they can not be profitably operated. This sort of comparison clearly indicates some mistakes that have been made in selecting locations for beet-sugar manufacture.

Section 2. Comparisons based on scale of operations.

The capacity of a beet-sugar factory is measured by the number of tons of beets which can be sliced in a day of 24 hours. The size of a factory should depend upon the field from which the beets are to be drawn and its possibilities. It is the usual plan in erecting

factories to build them so that their capacity may be later increased. How large to build a factory is no more than a guess, especially in communities where beet growing is not established. There is no doubt that districts that gave little promise have afterwards become remarkable beet districts, while others which were thought to be promising have resulted in failures.

Naturally the capacity of the first factories built was small. In 1896 there were seven factories reported to be in operation, none of which had a rated capacity of more than 1,000 tons. Four were rated at only 350 tons. In later years, as the industry became more firmly established, larger factories were built or the capacity of the older ones increased. During the campaign year 1913–14 there were 71 factories in operation. From the best information available 26 of these were rated as having a daily slicing capacity of 1,000 tons or more. In addition to this number 22 were capable of slicing 700 tons or more per day, 23 were rated as less than 700-ton plants, only 4 of which were less than 500-ton plants.

Due to local conditions it is rather difficult to compare the efficiency of large and small plants. It can be seen that the increase in the freight on beets might easily overcome any advantage obtained by large-scale operation. The importance of being favorably located is discussed elsewhere (see p. 141). Although the extraction is not increased in the larger factory it is the opinion of men well informed regarding the industry that the operating costs, especially the cost of labor and overhead charges, are less per bag of sugar produced. The views of certain managers on this point are of interest. The general manager of one of the largest beet-sugar concerns in the United States, in a statement to the commission regarding the efficiency of large and small plants, said:

> Assuming that size is the only essential point of difference, other conditions being equal, from our experience *there would be very little difference* in the efficiency of a large and a small factory, with the slight difference in favor of the large factory. The main reason for this is that a large factory's overhead expense per bag of sugar would not be quite so large as that of a smaller factory; but this overhead expense is such a small part of the total cost of producing a bag of sugar that the saving would be nominal. A large house might also make a slight saving in "Operating Labor" per bag of sugar. The saving mentioned, however, might easily be offset by a heavier average freight rate per ton of beets in case of the larger factory, as it would undoubtedly have to draw its supply from a greater distance than would the smaller.

The manager of another important company was even more emphatic in his statement, which was as follows:

> Concerning the efficiency of large and small plants having the same equipment, would say that the figures you are gathering

should show very distinctly that the plant of large capacity can produce sugar at a less cost than one of a smaller capacity. I believe you will find, however, in comparing these figures, that the lesser cost is due mostly to labor and not to materials used, although there is some slight saving in the amount of material used per ton of beets in a large factory as against a small one. I think you will find that the greater saving is the cost of overhauling and maintaining the factory.

Statements received from others engaged in the industry were in accordance with the above, especially with regard to labor costs. There was some difference of opinion as to how large a factory should be before the highest degree of efficiency was attained. Naturally these differences were due to the different conditions in the various localities. An exception was noted in the statement submitted by an official of the Utah-Idaho Sugar Co., in which he said that Utah and Idaho were better adapted to small plants of say 450 tons normal capacity. This was attributed to the fact that small factories could be worked to their utmost capacity, whereas if the capacity were increased the territory would necessarily have to be extended which was not advisable because of the uncertainty of railroad accommodations. For example, if sufficient cars could not be had beets would have to be piled at loading stations which would entail an additional expense in reloading and also greater shrinkage on account of more beets being exposed to atmospheric conditions.

The table below shows the results of factories according to their size. For comparative purposes, the total number of factories operating during the campaign 1913–14 have been divided into four groups: Group I includes the factories which sliced less than 500 tons of beets per day; Group II, those slicing more than 500 tons but less than 800; Group III, those slicing more than 800 tons but less than 1,200; and Group IV, those slicing more than 1,200 tons per day.

TABLE 31.—AVERAGE COST PER 100 POUNDS OF SUGAR PRODUCED, BY GROUPS, FOR THE YEAR 1913-14.

	Cost of beets.				Labor.	Repairs and maintenance.	Administrative and office expense.	Other expense less credits.	Net factory cost
	Paid farmer for beets.	Freight.	Other beet expense.	Total.					
Group I (12 factories).....	$2.572	$0.306	$0.307	$3.185	$0.419	$0.216	$0.279	$0.426	$4.525
Group II (25 factories).....	2.235	.183	.217	2.635	.326	.195	.202	.261	3.619
Group III (20 factories)....	2.230	.151	.158	2.539	.228	.139	.172	.224	3.302
Group IV (12 factories)....	2.121	.135	.130	2.386	.217	.122	.179	.398	3.302

The foregoing table shows that the net cost is without exception lowest in the groups which include the largest factories, ranging from

$3.302 in Group IV to $4.525 in Group I. This is due to a large extent to the difference in beet cost. The largest factories as a rule are situated in the best beet regions. The average price per ton of beets paid the farmers by the factories in the various groups is $5.67, $5.57, $5.65, and $6.04, respectively. The average cost for beets per 100 pounds of sugar produced in Group I was 33.7 cents more than in Group II and 34.2 cents more than in Group III. The average price per ton paid for beets was highest in Group IV, yet the beet cost per bag of sugar was lower in that group than in any other. The operating costs, excluding the cost of beets, are lower in the larger factories. The average costs of labor, repairs and maintenance, and administrative and office expense are materially lower in Groups III and IV. The largest difference is in the cost of labor, the average cost in Group IV being only 21.7 cents per bag, as compared with 41.9 cents in Group I.

The difference in the costs for Groups III and IV are not great for any item. The average for other expenses less credits is higher in the latter group, since most of these factories are equipped with Steffens houses (see p. 147), thus reducing the credit allowed for molasses. In fact the operating costs, excluding the cost of beets, is 10.9 cents less in Group III than in Group IV. This may be offset by the profit on the additional sugar extracted by this process, but it is evident any important advantage obtained by factories in Group IV as compared with those in Group III is only in the cost of beets.

In Table 21 (p. 81) it is noted that the average cost of production for the 5-year period covered was more than 4 cents per pound in 28 factories. Of this number, only one was rated in 1913 as having a capacity of more than 1,000 tons per day, while 17 were rated as less than 700-ton plants. The average cost was less than 4 cents but more than 3½ cents per pound in 17 factories, 10 of which were rated as being capable of slicing more than 1,000 tons per day. In 26 factories the average cost was less than 3½ cents per pound, the rated capacity of 15 being more than 1,000 tons. The largest factories are included in this group, and outside of the factories in Utah and Idaho there was only one whose capacity was less than 800 tons per day. Thus it is seen that, as a rule, the costs are higher in the smaller factory. It should be noted that the high cost of production in the majority of the small factories is due to their inability to get a sufficient supply of beets, rather than to their limited capacity. There is no doubt but that the efficiency of a factory depends largely on its being able to work near its full capacity. As the size of the factory is increased it becomes more difficult to obtain a sufficient supply of beets, so that in certain localities small plants are probably just as efficient, if not more

so, than larger factories would be. An example is noted in the case of the Utah-Idaho Sugar Co. This company has only one factory of a greater daily capacity than 1,200 tons, but the costs of its 600 and 800 ton factories compare favorably with the costs of the larger factory. Thus it is shown that while the results by comparison, in general, are in favor of large-scale operations, a comparison of individual factories would sometimes be favorable to small ones.

Section 3. Important economic advantage of favorable location.

It is obvious that mechanical efficiency is possible almost anywhere. This is not by any means true as to economic efficiency. In respect to the latter, location is of prime importance. This must be considered with respect to the quality and quantity of beets which can be and which are likely to be produced in the vicinity, the procuring of factory supplies and labor at comparatively low cost, and proximity to markets for sugar and the by-products from its manufacture. While it may not be possible for a factory to have the greatest advantage in all of these respects, it should be located with due regard to all and with particular regard to the first.

LOCATION WITH RESPECT TO THE SUPPLY OF BEETS.—It is probable that a great majority of the failures among beet sugar factories has been due to poor location in respect to the supply of beets. There should be a supply sufficient to assure an operating period of approximately 3 months at least. These beets must contain a sufficient percentage of sugar to warrant their manufacture. It would thus seem that in locating a factory the first element to be considered is the quality of beets that can be grown in a locality and, second, the quantity. While the climate and soil in a large part of the United States will permit the growing of sugar beets, the beets grown in a large portion of this area do not have a high sugar content. This materially limits the area in which factories can be built with the reasonable expectation of success. This report shows that as a rule the beet cost of the factory is lowest in the factory located in the regions where the best beets are grown, and since the beet cost represents such a large percentage of the total cost, the net factory cost of sugar is also usually lower in these factories. While the higher average extraction in some factories is due to the employment of the Steffens process and also to a slight extent to superior mechanical efficiency, it is mainly due to the difference in the quality of the beets worked.

The 75 factories operating all or part of the time during the 5 years ending with the season 1913–14 have been divided into three groups according to the average extraction of sugar per ton of beets

sliced. Group I includes those in which the average extraction was more than 270 pounds per ton, Group II embraces those in which the extraction was more than 240 pounds but less than 270 pounds, and those having an average extraction of less than 240 pounds are included in Group III. The results are shown in Table 32 below:

TABLE 32.—COMPARISON OF THE AVERAGE COST OF BEETS AND THE NET COST OF PRODUCTION, NOT INCLUDING DEPRECIATION, DURING THE 5-YEAR PERIOD 1909-13, BY FACTORIES GROUPED ACCORDING TO THE AMOUNT OF SUGAR EXTRACTED PER TON OF BEETS SLICED.

	Average Extraction (pounds).	Cost of beets.		Net cost.	
		Per ton of beets sliced.	Per 100 pounds of sugar.	Per ton of beets sliced.	Per 100 pounds of sugar.
Group I (includes 18 factories)	299.6	$6.46	$2.16	$9.51	$3.17
Group II (includes 27 factories)	255.4	6.54	2.56	8.97	3.51
Group III (includes 30 factories)	221.7	7.18	3.24	9.25	4.17
Total for United States	264.5	6.68	2.52	9.27	3.50

A particularly significant fact disclosed by the foregoing table is that the cost of beets per ton was lowest for those having the highest sugar extraction. This was due to two main causes—first, the factories working the poorest beets had difficulty in getting them at all and had to pay the farmer more than the sugar in them was worth; and, second, the difficulty in securing beets forced them to be brought from a wider territory, with the result that incidental expenses and freight charges were inordinately high. The average cost of beets per ton in Group I, with an extraction of almost exactly 300 pounds per ton, was $6.46, while in Group III, with an average extraction of only 222 pounds, the cost of beets was $7.18 per ton. In other words, the factories in Group III paid 72 cents more for 222 pounds of sugar than those in Group I paid for 300 pounds. This condition is strikingly reflected in the cost of beets per 100 pounds of sugar. In Group I, with an extraction of approximately 300 pounds per ton, the factory paid $1.08 per 100 pounds less for the sugar in the beets than was paid by the factories in Group III that had an extraction of only 222 pounds. The cost of beets per 100 pounds of sugar was 40 cents more in Group II than in Group I, although the extraction per ton of beets was 44 pounds less.

The net cost in Group I, where the cost of beets was lowest, was exactly $1 less than in Group III, where the cost of beets was highest, and it was 34 cents less than in Group II, where the cost of beets was 40 cents higher. The difference in the cost of beets per 100 pounds of sugar more than accounts for the difference in the net cost of produc-

tion in each case. It is thus apparent that a low cost of production must depend primarily on a low beet cost, and the lowest beet cost is in the factories in regions that produce the best beets. Of the factories whose net cost was more than $3.50 per 100 pounds, in only three was the average extraction more than 270 pounds, and their high cost is due to the fact that not enough beets were secured for a profitable run. Of those whose net cost was less than $3.50 per 100 pounds, in only one case was the average extraction less than 235 pounds per ton, and it was able to secure its beets at much below the average cost. The factories included in Group I produced 47 per cent of the total quantity produced by the 75 factories during this period, while the factories included in Groups II and III produced 31 per cent and 22 per cent, respectively.

All of the factories having the most favorable location with respect to the quality of beets are located west of the Mississippi River. The 18 factories included in Group I of Table 32 are all in that region. Of these, 8 are in California, 5 in Colorado, 2 in Idaho, and 1 each in Utah, Montana, and Kansas. Of the 27 factories in Group II, 20 are west of the Mississippi. Of this 20, 7 are in Colorado, 4 each in California and Utah, 3 in Idaho, and 1 each in Nebraska and Nevada. Of the remaining 7, 6 are in Michigan and 1 in Wisconsin. Of the 30 factories having an extraction of less than 240 pounds of sugar per ton of beets, only 10 are west of the Mississippi. These figures emphasize the superior quality of the beets grown in Colorado and the West as compared with those grown in the Lake States.

One of the chief inherent disadvantages of the industry is the shortness of the campaign, the average length of the campaign in California for the five-year period being only 109 days and this was from 12 to 63 days longer than in any other State. The results in many factories would be much more satisfactory if enough beets could be had to insure a longer campaign. This is shown by the following excerpt from a statement issued by the officers of one company to its stockholders at the end of the 1913 campaign:

> The campaign just closed has been like the four preceding ones, extremely disappointing. The tonnage of beets secured has not been sufficient to give our mill a profitable run. The burden of debt accumulated as the result of the many adverse circumstances against which the company has had to contend has become so great that it can no longer be carried.

It is obvious that the overhead charges for salaries, taxes, etc., are practically the same in a factory whether it operated for a long or short period. The average cost for these items per 100 pounds of sugar produced are therefore higher in factories operating for a short time. This is also often true of other items of cost. This is shown by the higher manufacturing cost for such factories as compared

with the cost of those which operated for a longer period. The average manufacturing cost of the factories whose average campaign for the 5-year period was less than 70 days was $1.40 per 100 pounds, as compared with 95 cents for those which were in operation longer than 70 days. Of the 19 factories whose average length of campaign was less than 70 days in only 3 was the manufacturing cost less than $1, while in 5 it was more than $2 per 100 pounds of sugar produced.

A concrete idea of the importance of a sufficient supply of beets to operate a factory at its normal capacity can be had by considering a few instances where the supply was greatly deficient. It is generally agreed among beet sugar manufacturers that the highest efficiency in a beet sugar factory depends mainly upon being operated at practically full capacity for a period of 100 days. The figures used in these illustrations are based upon such an operating period. A factory, mechanically well equipped, and having a capacity of 900 tons, had only about 30,000 tons of beets in 1913, when it should have had 90,000 tons. Another factory with a daily capacity of 500 tons sliced during that year less than 8,000 tons, when the most efficient operation would have required 50,000 tons. Still another, with a daily capacity of 600 tons sliced less than 17,000 tons of beets instead of 60,000 tons which it should have had. These are striking examples of economic inefficiency, and a number of others almost if not quite as significant could be cited.

Inability to secure a sufficient quantity of beets, however, can not always be foreseen. This is especially true in localities where the industry is not well established. The failure of irrigation projects, the introduction of better paying crops, or the general dissatisfaction among growers may change what promises to be an ideal beet region into a poor one. In one case it is said that as an inducement the chamber of commerce of a certain town represented to the promoters of a factory that they had signed contracts for the growing of several thousand acres of beets. After the factory had been moved there, it developed that the contracts were signed largely by people who owned no land and who never intended to grow beets. In other cases larger factories have been built than the immediate vicinity would or could supply, and the factory has been either compelled to grow its own beets at a higher cost or secure its beets at a greater distance from the factory with a consequent inordinately high cost. The lack of beets in certain sections may also be due to the fact that the factories and growers have failed to fully realize the proper relation that should be maintained between the factory and the beet grower.

Labor and factory supplies are less important, since the cost for these items represents a smaller per cent of the total cost. Differences in costs are also due to the difference in the size of the factory, as

shown in section 2 (see p. 137). Differences in the labor costs and administrative and office expense are also due to the fact that wages and salaries are materially higher in the West than in the Lake States. The cost of fuel also varies to some extent in the various factories. It is not probable that the high cost of freight on the supplies used in connection with the manufacture of sugar or even the high cost of labor would preclude any factory from manufacturing sugar profitably if sufficient beets of a good quality were available.

ADVANTAGE OF PROXIMITY TO MARKETS.—Since the price of beet sugar is based primarily on the price of refined cane sugar at the seaboard, it is obvious that any advantage obtained in markets must be due to the location of the factories with respect to this competition. Prices for sugar, therefore, are higher at interior markets than at points nearer the refineries. The factories which have the greatest advantage in this respect, however, are located in the sections of the country which consume the least sugar, so that their advantage is not as great as it would be if they were able to sell all of their product locally or in near-by States. The average price received by the factories in the various States and the cost of selling per 100 pounds of sugar, including freight, during the five-year period is shown in the following table:

TABLE 33.—COMPARISON OF THE AVERAGE PRICES RECEIVED FOR BEET SUGAR; THE COST OF SELLING AND THE NET PRICE RECEIVED AT THE FACTORY PER 100 POUNDS, FOR THE 5-YEAR PERIOD 1909-13, BY STATES.

State.	Selling price.	Cost of selling.	Net price at factory.
California	$4.8795	$0.4574	$4.4221
Colorado	4.9231	.4462	4.4769
Utah-Idaho	5.0835	.5780	4.5055
Michigan [1]	4.8251	.3010	4.5241
Wisconsin	4.9327	.2616	4.6711
Ohio	4.7602	.3429	4.4173
Montana-Nebraska	5.1573	.4953	4.6620
Other States [2]	4.9838	.2986	4.6852
Total, United States	4.9277	.4278	4.4999

[1] Includes factories at Decatur, Ind., and Paulding, Ohio.
[2] Includes factories in Arizona, Nevada, Kansas, Oregon, Minnesota, and Iowa.

In the above table it is seen that the price at which sugar is sold is highest in Montana-Nebraska and Utah-Idaho and lowest in Ohio and Michigan. In California competition with the refineries at San Francisco is encountered so that the selling price is lower than in other Western States. Factories, although located at a great distance from the large consuming centers, are enabled to realize as high an average price for their product as those which disposed of

their product on lower freight rates. For example, in Utah-Idaho the average net price received was only 2 cents per 100 pounds less than the price in Michigan, although the cost of selling, including the freight, was 28 cents more. The average net price received at the factory was highest for the factories included in the group "Other States," Wisconsin and Montana-Nebraska, while the lowest was in Ohio and California. The larger part of the product of the factories in the first-named States is disposed of locally or in adjoining States, thus giving them a decided advantage over companies which must sell the greater part of their product in competitive territory on higher freight rates. In two companies the average net price received for the five-year period was $5.11 and $5.29 per 100 pounds, respectively, while the average for all companies in the United States was only $4.50. In large companies, however, the difference in the average net price received is less, rarely exceeding 20 or 30 cents per 100 pounds.

Some advantage is also obtained in the marketing of the two chief by-products from the manufacture of sugar, namely, pulp and molasses. In Chapter III (see p. 61), the net value of these products as affecting the net cost of production is discussed. In Table 19 (see p. 82), it is shown that the profit from these sources is greater in the factories located in the Lake States than in factories located in the West. The advantage obtained with respect to molasses is largely overcome, however, by the use of certain processes by which a large per cent of the sugar in the molasses is extracted.

Section 4. Comparisons based on factory equipment.

Most of the beet-sugar factories in the United States are similarly equipped, except as to that portion of their equipment provided for the utilization of by-products. There are but two by-products resulting from the manufacture of sugar from beets that have any important value. These are pulp and molasses. A number of factories have special equipment for the better utilization of one or both of these by-products. Pulp and molasses are both utilized to advantage by all factories. Some, however, are so situated as to require special equipment for their most advantageous utilization. Pulp is utilized entirely as a food for stock, and this is in a great measure also true of molasses, though the latter is used to some extent in the manufacture of alcohol.

Where pulp can not be sold to advantage in its green state at the factory, it is necessary to dry it in order that it may be shipped at a reasonable cost. The molasses resulting from the process of sugar manufacture contains a large percentage of sugar, and unless there is a profitable market for the molasses itself it is often profitable to extract the sugar left therein. There are two or three processes

for the extraction of sugar from molasses, but that principally used in this country is known as the Steffens process.

STEFFENS PROCESS.—While beet sugar molasses contains a large per cent of sugar it is not used for human food because of the large quantity of mineral salts present. These mineral substances prevent the sugar from crystalizing by the use of the ordinary processes of clarifying, and special processes have been employed in extracting the sugar from the molasses. As just stated, the most common method is the Steffens process. About 25 pounds of sugar are extracted from the molasses resulting from the working of each ton of beets. All the sugar in the molasses, however, is not recovered, the proportion varying from 80 to 90 per cent of the sugar content of the molasses. By the Steffens process a larger percentage of the sugar is recovered than by other processes.

Whether it is profitable to use this process depends upon the price of molasses and of sugar. If the market value of molasses is high, say about $12 to $15 per ton, it is the general opinion that it is not profitable to install a Steffens plant unless the price of sugar is very high. The manager of an eastern factory stated that he questioned the practicability of operating a Steffens house, even after the plant had been constructed, with molasses at $12 per ton; and that if the price of molasses had been as high when the industry was started in this country as it is now no Steffens plants would have been erected. Since molasses is used chiefly for a stock food, much depends therefore on the location of the factory. Factories near the stock-feeding sections may be able to dispose of their molasses at a high price while those some distance from these markets may find it more profitable to convert as much of their molasses into sugar as possible. A few factories are able to dispose of their molasses to manufacturers of alcohol.

In 1913 there were at least 26 ractories equipped with Steffens houses. Of these 6 were located in California, six in Colorado, 5 in Michigan, 2 each in Ohio and Wisconsin, and 1 each in Kansas, Nebraska, Montana, Utah, and Idaho. The Steffens plants in the Wisconsin factories have not been operated for some years. It is important to note in this connection that more molasses is subjected to this process than that produced by the factories operating Steffens houses. Some concerns buy molasses from other factories and some companies having two or more factories have a Steffens plant in one and ship the molasses from their other plants to this factory. For instance, the Great Western Sugar Co. has 9 plants located in northern Colorado, only 4 of which are equipped with Steffens houses, but the molasses from the other 5 plants is worked up in these 4 Steffens plants.

During the season of 1913–14 there were 23 factories operating Steffens plants. The average profit on the residual molasses—that is, after the molasses had been passed through this process—was 17.2 cents per ton of beets worked. The average profit on molasses in the remaining 46 factories in operation that year amounted to 39.1 cents per ton of beets worked. The first named factories in order to realize as much from this by-product as was realized by the factories which sold their entire output of molasses would have had to extract enough additional sugar to overcome all expenses incidental to operating and maintaining the process, and in addition about 5½ pounds from each ton of beets worked, assuming that the net value of sugar was 4 cents per pound. The costs incidental to the Steffens process were not reported separately by all companies and as stated above many factories buy molasses from other factories, so that the Steffens costs incidental to working up their own product can not be ascertained. However, the cost of operating and maintaining the process in two representative factories which did not purchase molasses was only about 10 cents per ton of beets worked. The cost per ton of beets worked no doubt would be somewhat higher in a smaller factory, but it is apparently fair to assume that if the factories which had Steffens plants increased their average extraction 10 pounds they realized as much profit from this by-product as the factories that sold their entire product of molasses.

The average extraction for the factories not employing the process in 1913 was only 240 pounds while the average extraction of those which had Steffens plants was 283 pounds per ton of beets sliced. While this difference is partially due to the better quality of beets it is largely due to the additional sugar obtained from the molases by the latter factories. In the statement below are shown the results for the five years 1909 to 1913 in two California factories, one with Steffens process and one without, where the difference in quality of beets was not great. The average purity of the beets worked by each factory was above 85 per cent.

	Factory No. 1 (without Steffens process).		Factory No. 2 (with Steffens process).	
	Sugar content.	Average extraction.	Sugar content.	Average extraction.
	Per cent.	*Pounds.*	*Per cent.*	*Pounds.*
1909–10	18.88	304.4	17.33	306.4
1910–11	18.84	310.6	18.28	337.6
1911–12	18.87	311.2	18.03	341 8
1912–13	18.87	298.6	18.80	341.2
1913–14	18.06	281.0	18.57	345.5
Average, 5 years	18.68	300.5	18.16	333.6

Factory No. 1 was not equipped with a Steffens plant, and although the average sugar content of its beets was generally higher than in factory No. 2, the extraction in each year was less than in the latter factory. The purity of the beets worked in factory No. 1 was also higher than in factory No. 2 in 4 of the 5 years, and in 1913–14 practically the same. For the 5-year period the sugar content of the beets sliced in the former factory was 0.52 per cent higher, while the average extraction was 33 pounds per ton less. Thus it is seen that by employing this process the extraction is materially increased. While the per cent of increase would be less in factories slicing a lower grade of beets, the average extraction for all factories would probably have been increased 25 pounds per ton of beets had the molasses from all factories been subjected to this process.

While it would seem that if the extraction could be increased by this amount, a Steffens house would almost be necessary to the equipment of an efficient factory, it should be borne in mind that the cost of installing the process is high and much more labor is required in a factory so equipped. Companies which have more than one factory might find it profitable to install a Steffens house at one of its factories, which could utilize the molasses from those not so equipped, while a company with only one factory and of small capacity could not do so at a profit. Others have a good market for their molasses, so that a company adding this process should be governed largely by the conditions peculiar to its own factory or factories.

PULP DRIERS.—When beets are worked about 80 per cent of their weight comes out in the form of pulp. As this pulp comes from the factory it contains a small amount of sugar, most of the nonsugars or impurities shown in the chemical analysis of the beets and a large per cent of water. In the green or undried state it can not be kept for any great length of time nor can it be profitably transported any considerable distance. It is used for stock food, and where it can not be fed to cattle or sheep in the locality of the factory it must either be dried for shipment or go to waste. In the earlier days of the industry practically all the pulp was disposed of at the factory. In fact, much of it was given away to farmers supplying the factory with beets. It is said that in the State of Michigan there were times when considerable pulp had to be removed as waste. This fact probably resulted in the installation of driers, since the first drying appliances were installed in that State.

The pulp is dried in revolving cylindrical drums, the heat being applied either directly from hot gases or indirectly by steam. The more recently installed driers are of the steam type.

An increased demand for dried pulp is indicated by the number of factories which have added driers to their plant equipment in recent years. In 1908, according to the report issued by the Department of Agriculture (Report No. 90, Progress of the Beet Sugar Industry in the United States, 1908) there were only 11 factories which had driers, all of which were located in the Lake States. In 1913 there were 30 factories reporting sales of dried pulp. These factories were distributed as follows: Fifteen in Michigan, 5 in California, 4 in Wisconsin, 3 in Ohio, and 1 each in Indiana, Kansas, and Minnesota. It will be noted that the 5 factories in California have installed driers since 1908, and that there are no driers in Colorado. The absence of pulp driers in Colorado factories is no doubt due mainly to the fact that there is sale for the pulp to the cattle feeders in the vicinity of the factories and partly to the fact that these factories are such a distance from other cattle-feeding regions that freight on the pulp is so high as to absorb most of the profits.

In some localities dried pulp is sold for as much as $20 per ton. The comparative advantage of selling pulp green or dried is difficult to state with exactness. This depends of course upon the location of the factory with respect to cattle feeders and upon the price of other foods. One factory in California sells its pulp in the wet state, and during the three years ending with the season 1913 realized a profit for pulp of only 12 cents per ton of beets worked. In another California factory, equipped with a drier, the profit was $1.11 per ton of beets worked. The installation of a drier costs approximately $100,000, and with the prices for dried pulp that have prevailed in recent years this seems to be a profitable investment.

In Table 19 (see p. 82) there is shown the average net value of pulp per 100 pounds of sugar produced during the 5-year period by States. It will be noticed that the averages for Wisconsin, Michigan, and Ohio, where most of the factories are equipped with driers, are materially higher than in other States. Since the date of installation of pulp driers in a number of factories is not precisely known to the commission it is not possible to make comparisons in the industry as a whole except for the one year 1913–14. Of the 69 factories operating in that year from which reports were obtained 30 reported the sale of dried pulp. The net profit on pulp realized by those factories having driers was 21.2 cents per 100 pounds of sugar produced, while in the other 39 factories which had no driers the profit was only 5.7 cents.

The importance of this by-product is also indicated by a comparison of the profits from this source with the total earnings for all companies. The total earnings in the beet sugar business in 1913–14 before deducting depreciation was $5,777,226.92, and $1,610,351.78, or 28 per cent of this, was net receipts on pulp. If

all the factories operating in that year had been equipped with pulp driers and had they all realized this rate of profit on pulp, the earnings in the industry as a whole would have increased nearly $1,500,000. While it is not reasonable to assume that all factories could have realized so large a profit from this source, due to the fact that some are inaccessible to the markets, these figures do indicate that a pulp drier is a very important factor in the efficient equipment of those factories within reach of dried pulp markets.

Section 5. Conclusions.

There is opportunity for materially increased efficiency in many beet sugar factories. The figures in Table 17 (see p. 78) abundantly confirm this view. During the 5 years covered by this report factory numbered 17, as shown in that table, had an average conversion cost of only 44 cents per 100 pounds of sugar, not including depreciation. Other factories in the same vicinity, and some of them operated by the same company that operates factory No. 17, had a cost of from 65 cents to $1. Factory No. 26 had a conversion cost of 87 cents, while factory No. 25, operated by the same company in the same State, had a cost of $1.16. Factory No. 37 had a cost of 77 cents, while other factories operated by the same company in the same immediate region had costs ranging as high as $1.08. The costs of conversion here enumerated are the net cost after deducting the net profits from by-products. The factories in each of the groups here enumerated operated under similar conditions with respect to the supply and quality of beets. Comparisons of this sort could be multiplied.

While it is not to be expected that every beet sugar factory could reduce its conversion cost to 44 cents per 100 pounds, it is not unreasonable to conclude that no factory that is well located with respect to an ample supply of beets of good quality should have a net conversion cost of as much as $1 per 100 pounds of sugar. It at least seems probable that with even ordinary regard for efficiency in equipment and methods of operation the average cost of conversion in a considerable number of factories could be greatly reduced.. Of course no degree of efficiency in operation can result in a low cost of conversion for those factories so situated as to have an inadequate supply of beets or those in regions where the quality of the beets is extremely low.

CHAPTER VII.

RELATIONS BETWEEN SUGAR MANUFACTURERS AND BEET GROWERS.

Section 1. Interdependence of the two interests.

Perhaps no other manufacturing industry is so sensibly dependent upon agriculture as the beet sugar industry. On the other hand, no other branch of farming of equal importance is so entirely dependent upon a strictly local industry. Other industries are dependent upon the farmer for their principal raw material, but their relations with the farmer are so distant as not to be a sensitive factor. The cotton manufacturer and the miller must depend upon the cotton and grain grower respectively for their supplies of raw material, but millions of farmers in various parts of the world grow these commodities. These farm products are of such a character and their manufacture is of such a nature that they can be economically shipped thousands of miles. Thus the farmer and the manufacturer may be widely separated.

Sugar beets, however, can not be economically shipped a long distance. Only about 12½ per cent of the weight of beets is extractable sugar, the extreme range being from about 10 per cent to about 16 per cent, and the average is about 12½ per cent. Thus, if freight charges on a ton of beets is 40 cents, or 2 cents per 100 pounds, the charge on the extractable sugar will average about 16 cents per 100 pounds. It is apparent, therefore, that the sugar factory and the beet grower must be near each other; otherwise, the farmer must sell his beets at a lower price than he can afford. The sugar manufacturer must obtain his beets at a price that will enable him to sell his product in competition with cane sugar or he will fail. Furthermore, before a sugar factory is built, owners of capital should be assured of a sufficient quantity of beets not merely for one year but for several years.

These conditions result in a close bond of common interest between the manufacturer and the farmer. This interdependence, however, is not evenly balanced because when the farmer can grow other crops at a profit equal to or greater than that derived from beets he is likely to do so. That is to say, if for any reason beets should not be as satisfactory as some other crop, he can generally utilize his land

without suffering disadvantage. The farmer therefore is not entirely dependent upon the sugar factory. If he expects to grow beets at all, however, he must have a factory reasonably near him. It may be argued by some that the manufacturer is not entirely dependent upon the farmer for the reason that he has the alternative of growing his own supply of beets. Practical experience, however, does not support this argument. In general, the growing of beets by the manufacturer in sufficient quantity to supply his factory is not feasible. Sometimes the necessary land can not be had, and even when it can experience has frequently failed to commend this method of obtaining a beet supply. The results of farming operations engaged in by sugar manufacturers have often resulted in loss. Practically, therefore, the manufacturer is dependent upon the farmer for his supply of beets.

The history of the beet-sugar industry in this country has conclusively demonstrated this interdependence of the two interests. With few exceptions no beet-sugar factory has been successful where it could not depend upon the farmers in the community where it was erected. The failure of a number of factories, and probably most of those that have been unsuccessful, has been due to the unwillingness or the inability of the farmers to supply a sufficient quantity of beets, or if the quantity was sufficient the quality was too low to be profitable to the factory. This close relation between the sugar manufacturer and the beet grower suggests the desirability of hearty, friendly cooperation between the two interests.

Section 2. Contract prices for beets.

Practically all sugar-beet growers enter into contract with the sugar manufacturers for the sale of their beets before the seed are planted. It is a rare thing to find a farmer growing beets without a contract. This is due in the first place to the fact that the beet-sugar manufacturer must have reasonable assurance of a sufficient quantity of beets to operate his factory, and in the second place to the desire of farmers generally to have some assurance in advance of planting as to the price they will receive for their beets.

There are numerous variations in the terms of the contracts, particularly in respect to the price that is to be paid. Speaking broadly, all prices are based on the sugar content of the beets. In many cases, however, this basis embraces a considerable range of sugar content, and it is therefore rather indefinite. Generally there is a base price for a specified range in the percentage of sugar and a scale of advance in price as the percentage increases above the maximum of the basis range. In other cases there is a flat rate for all beets where the sugar content does not fall below a certain per cent.

There is also frequently a minimum content below which the factory will not take the beets. Sometimes there is a limitation as to the maximum size of the beets, those that are extremely large not being desirable.

That portion of the contract relating to the price to be paid for beets during the past 2 or 3 years is shown below for several companies operating in the principal beet sugar producing sections. These contracts do not cover all the factories, but they represent those companies that produce the bulk of the beet sugar.

CONTRACTS IN 1913 AND 1914.—The contracts for the year 1914 used by most of the companies operating in Michigan provided for the payment for beets as follows:

> Said beets shall be harvested and loaded by the grower for the company on cars, or delivered at factory sheds, at such time and in such quantities as may be directed by the company. The company will not be liable to receive or pay for beets which do not test 12 per cent sugar, are rotten, or otherwise unfit or undesirable for making sugar.
>
> For beets delivered under this contract and loaded on cars by the grower, the company will pay five dollars ($5) per ton at loading point; and for beets delivered to the company's factory by wagon and unloaded by the grower into the company's beet bins, the company will pay five dollars and sixty cents ($5.60) per ton. Both of above prices are to be applied to weight of beets after making deductions for dirt and improper topping. Payments to be made on the 15th of the month following the delivery of beets.

Prior to 1914 the contracts of the Michigan companies provided for a rate of $4.50 a ton for beets having a sugar content of not less than 12 per cent and 33⅓ cents for each additional 1 per cent of sugar.

Some of the factories in Ohio have had two forms of contract, one with a sliding scale and the other providing for a flat rate. The sliding scale contract used in 1913 was as follows:

> For all beets grown and delivered at the factory under the above conditions, the sugar company agrees to pay four dollars and fifty cents ($4.50) per net ton weight for beets, and 33⅓ cents per ton more for each 1 per cent of increase in the amount of sugar above 12 per cent.
>
> The grower will be paid under this contract all the beets are worth according to test, and is guaranteed not less than $5 per ton delivered at railway station.

The provisions of the flat rate contract were as follows:

> The beets are to be given due care, and as far as practicable the undersigned will follow instructions in regard to selecting

and preparing the soil, seeding, caring for and harvesting the crop. The beets will be paid for at the rate of five dollars ($5) per ton.

Said beets shall be harvested and delivered by the grower to the company at such times and in such quantities as may be directed by the company, allowing each grower his pro rata amount. The company will not be liable to receive or pay for beets improperly topped or which are rotten or otherwise unfit or undesirable for making sugar.

It will be noted that the 1913 sliding scale contract above quoted guarantees not less than $5 per ton and it is assumed that this guarantee was made upon the theory that the beets would have a sufficient sugar content to call for $5 per ton under the contract.

The contract with the beet growers in the vicinity of Billings, Mont., for the year 1913 with regard to prices was as follows:

Beets delivered and accepted will be paid for by the company as follows:

$5 per ton for beets testing not less than 12 per cent sugar and under 14 per cent.

5.12½ per ton for beets testing not less than 14 per cent sugar and under 14.5 per cent.

$5.25 per ton for beets testing not less than 14.5 per cent sugar and under 15 per cent.

$5.50 per ton for beets testing not less than 15 per cent sugar and under 15.5 per cent.

$5.62½ per ton for beets testing not less than 15.5 per cent sugar and under 16 per cent.

$5.75 per ton for beets testing not less than 16 per cent sugar and under 16.5 per cent.

$5.87½ per ton for beets testing not less than 16.5 per cent sugar and under 17 per cent.

$6 per ton for beets testing not less than 17 per cent sugar and under 17.5 per cent.

$6.12½ per ton for beets testing not less than 17.5 per cent sugar and under 18 per cent.

$6.25 per ton for beets testing not less than 18 per cent sugar and under 18.5 per cent.

$6.37½ per ton for beets testing not less than 18.5 per cent sugar and under 19 per cent.

$6.50 per ton for beets testing not less than 19 per cent sugar and under 19.5 per cent.

And 12½ cents per ton additional for each one-half per cent above 19.5 per cent.

The contracts in Montana for 1914 prescribed a base price of $4.75 per ton, but because of the increase in the price of sugar when the time of delivery came the growers were paid according to the contract for 1913.

The contract with the growers in the vicinity of Scottsbluff, Nebr., in 1912 and 1913, provided for a flat rate as follows:

That it, its successors or assigns, will purchase all beets suitable for sugar-making purposes, grown, harvested, and delivered in accordance with the terms, specifications, and requirements of this contract and pay therefor at the rate herein specified (less

the usual deductions for dirt, leaves, and improperly topped or damaged beets), to wit:

For all beets delivered at factory or designated receiving stations in good condition, of eighty (80) per cent purity or better, and containing twelve (12) per cent or more sugar___ $5.00

It being agreed and understood that the company shall not be obliged to receive any beets prior to October 15th containing less than fifteen (15) per cent sugar.

The contract for 1914 with the growers at Scottsbluff provided for a flat rate of $4.50 per ton, but at the time of delivery the manufacturers restored the 1913 price.

The contract with the growers in northern Colorado for 1913 was as follows:

Beets delivered and accepted will be paid for by the company as follows:

$5 per ton for beets testing not less than 12 and under 14 per cent sugar.
$5.125 per ton for beets testing not less than 14 and under 14.5 per cent sugar.
$5.25 per ton for beets testing not less than 14.5 and under 15 per cent sugar.
$5.50 per ton for beets testing not less than 15 and under 15.5 per cent sugar.
$5.625 per ton for beets testing not less than 15.5 and under 16 per cent sugar.
$5.75 per ton for beets testing not less than 16 and under 16.5 per cent sugar.
$5.875 per ton for beets testing not less than 16.5 and under 17 per cent sugar.
$6 per ton for beets testing not less than 17 and under 17.5 per cent sugar.
$6.125 per ton for beets testing not less than 17.5 and under 18 per cent sugar.
$6.25 per ton for beets testing not less than 18 and under 18.5 per cent sugar.
$6.375 per ton for beets testing not less than 18.5 and under 19 per cent sugar.
$6.50 per ton for beets testing not less than 19 and under 19.5 per cent sugar.
And 12½ cents per ton additional for each additional one-half of 1 per cent increase thereafter.

In 1914 the Great Western Sugar Co. paid a flat rate of $4.50 a ton to some growers in northern Colorado, but generally a sliding-scale contract was adopted that fixed the base price at $4.75. As in the case of Montana and Nebraska, the Great Western restored the 1913 price when the price of sugar rose in 1914.

A contract used by one company in southern Colorado provided the following prices for the year 1913:

The company agrees to purchase from first party the net beets grown on acreage as above mentioned.

First. To pay therefor for all beets grown under this contract, after proper tare deductions have been made for dirt, rocks, leaves, and improper topping, as follows:

$5 per ton for beets testing not less than 12 per cent sugar and under 14 per cent.
$5.12½ per ton for beets testing not less than 14 per cent sugar and under 14.5 per cent.

$5.25 per ton for beets testing not less than 14.5 per cent sugar and under 15 per cent.
$5.50 per ton for beets testing not less than 15 per cent sugar and under 15.5 per cent.
$5.62½ per ton for beets testing not less than 15.5 per cent sugar and under 16 per cent.
$5.75 per ton for beets testing not less than 16 per cent sugar and under 16.5 per cent.
$5.82½ per ton for beets testing not less than 16.5 per cent sugar and under 17 per cent.
$6 per ton for beets testing not less than 17 per cent sugar and under 17.5 per cent.
$6.12½ per ton for beets testing not less than 17.5 per cent sugar and under 18 per cent.
$6.25 per ton for beets testing not less than 18 per cent sugar and under 18.5 per cent.
$6.27½ per ton for beets testing not less than 18.5 per cent sugar and under 19 per cent
$6.50 per ton for beets testing not less than 19 per cent sugar and under 19.5 per cent.
And 12½ cents per ton additional for each additional half of 1 per cent increase thereafter.

Another factory in southern Colorado in 1913 secured contracts at the following rates:

For beets delivered, samples of which test not less than twelve (12%) per cent and up to sixteen (16%) per cent sugar to the weight of the beet, and a purity of not less than 80%, per ton of 2,000 lbs	$5.50
For beets delivered, samples of which test sixteen (16%) per cent sugar or more, per ton of 2,000 lbs	6.00

In 1914 this latter factory adopted the following scale of prices:

For beets delivered, samples of which test not less than twelve (12%) per cent and up to sixteen (16%) per cent sugar to the weight of the beet, with a purity of not less than 80%, per ton of 2,000 lbs	$5.00
For beets delivered, samples of which test sixteen (16%) per cent sugar to the weight of the beet, and above, with a purity of not less than 80%, per ton of 2,000 lbs	5.50

This company stipulated in its contracts for both years that it would not be bound to receive any beets testing less than 12 per cent in sugar or containing less than 80% purity.

The schedule of prices shown in the contract of another company operating in southern Colorado was as follows:

For beets testing—	Per ton.
25 per cent sugar	$9.33⅓
24 per cent sugar	9.00
23 per cent sugar	8.66⅔
22 per cent sugar	8.33⅓
21 per cent sugar	8.00
20 per cent sugar	7.66⅔
19 per cent sugar	7.33⅓
18 per cent sugar	7.00
17 per cent sugar	6.66⅔
16 per cent sugar	6.33⅓

For beets testing—	Per ton.
15 per cent sugar	$6.00
14 per cent sugar	5.66⅔
13 per cent sugar	5.33⅓
12 per cent sugar	5.00

33⅓ cents per ton additional for each per cent above 25 per cent, fractions in proportion.

This company reserved the option of rejecting beets showing less than 12 per cent of sugar or less than 80 per cent purity.

The schedule of prices shown in the contract employed in the vicinity of Grand Junction, Colo., in 1913, was as follows:

> Beets delivered and accepted will be paid for by the company as follows:
> $5 per ton for beets testing not less than 12 per cent sugar and under 15 per cent.
> $5.25 per ton for beets testing not less than 15 per cent sugar and under 15.5 per cent.
> $5.375 per ton for beets testing not less than 15.5 per cent sugar and under 16 per cent.
> $5.50 per ton for beets testing not less than 16 per cent sugar and under 16.5 per cent.
> $5.625 per ton for beets testing not less than 16.5 per cent sugar and under 17 per cent.
> $5.75 per ton for beets testing not less than 17 per cent sugar and under 17.5 per cent.
> $5.875 per ton for beets testing not less than 17.5 per cent sugar and under 18 per cent.
> $6 per ton for beets testing not less than 18 per cent sugar and under 18.5 per cent.
> $6.125 per ton for beets testing not less than 18.5 per cent sugar and under 19 per cent.
> $6.25 per ton for beets testing not less than 19 per cent sugar and under 19.5 per cent.
> $6.375 per ton for beets testing not less than 19.5 per cent sugar and under 20 per cent.
> And twelve and one-half cents (12½c.) per ton additional for each one-half per cent above 20 per cent.

In 1914 this company reduced the price to a flat rate of $4.75 per ton.

In 1911, 1912, and 1913 beets were bought under at least two rates in Idaho. The following were the rates paid under one form of contract:

> For all beets in good condition of eighty (80) per cent purity or better, and containing fifteen (15) per cent sugar, five dollars ($5) per ton.
> For all beets in good condition of eighty (80) per cent purity, containing no less than twelve (12) per cent and under fifteen (15) per cent sugar, four dollars and twenty-five cents ($4.25) per ton.

Under another form of contract the following rates were paid:

> For all beets in good condition of eighty (80) per cent purity or better, and containing fifteen (15) per cent or more sugar, five dollars ($5) per ton.
>
> For all beets in good condition of eighty (80) per cent purity, containing not less than twelve (12) per cent and under fifteen (15) per cent sugar, four dollars and seventy-five cents ($4.75) per ton.

Under both of the above contracts the sugar company was not bound to receive beets of less than 80 per cent purity or that tested less than 12 per cent sugar.

In Utah and Idaho in 1913 both a sliding scale and a flat-rate contract were in use. The provisions of the flat-rate contract were as follows:

> Such beets shall contain not less than 12 per cent saccharine, with a purity of 80 per cent.
>
> * * * * * * *
>
> It shall be optional with the sugar company to accept or reject any beets not delivered on or before the last day of November.
>
> * * * * * * *
>
> The sugar company agrees that on or about the 15th day of each month it will pay $4.75 per ton at factory for all beets received during the preceding calendar month.

The sliding-scale contract in Utah was as follows:

> During the month of September and up to October 20, inclusive, it will purchase at $5 per ton all beets grown upon said land that may have an average polarization of not less than 15 per cent saccharine and 80 per cent purity; such beets to be delivered only as ordered by the sugar company, but after October 20 as rapidly as the grower may desire.
>
> In case any part of the beets raised hereunder shall not be delivered before November 1, or if the delivery of any part thereof shall be stopped before that date because the polarization shall not equal the required standard, then the sugar company agrees thereafter and up to November 30 to purchase all such beets not previously ordered or delivered as may polarize more than 12 per cent and less than 13 per cent saccharine with 80 per cent purity at $4.25 per ton; and all containing 13 per cent and less than 14 per cent saccharine with 80 per cent purity, at $4.50 per ton; and all containing 14 per cent and less than 15 per cent saccharine with 80 per cent purity, at $4.75 per ton; and all containing 15 per cent or more saccharine with 80 per cent purity, at $5 per ton.
>
> It shall be optional with the sugar company to accept or reject any beets not delivered on or before the last day of November.

The above prices were also paid in Utah in 1914.

There was considerable variation in the prices paid in California. Those representing the purchase of probably the greater portion of

beets grown are here shown. A sliding-scale contract used in 1912, 1913, and 1914 by one company was as follows:

> The company will weigh and pay the grower for all beets delivered and accepted, after above deduction, the following prices per ton of 2,000 pounds:
>
> Beets testing 15 per cent sugar, $5.25 per ton, with an additional 25 cents per ton for each 1 per cent of sugar above 15 per cent. Fractions of a per cent in proportion. Beets testing under 15 per cent sugar down to 11 per cent sugar, $5 per ton. The company reserves the right to reject beets testing under 11 per cent sugar not suitable for making sugar.
>
> The company will also pay all railroad freights on beets loaded on cars, provided cars be loaded to full capacity. Demurrage charges shall be paid by the grower.

A flat-rate contract used by the same company was $5.50 per ton and the company reserved the right to reject beets testing under 11 per cent. Another company in 1912 and 1913 paid for its beets on a scale as follows:

> Beets testing fifteen (15) per cent sugar, five ($5) dollars per ton, with an addition of thirty (30) cents per ton for each one (1) per cent of sugar above fifteen (15) per cent and a deduction of twenty-five (25) cents per ton for each one (1) per cent below fifteen (15) per cent, down to and including eleven (11) per cent; fractions in proportion.
>
> Beets testing under eleven (11) per cent will be accepted as if testing eleven (11) per cent if weighing under five (5) pounds. The factory reserves the right to reject beets testing under eleven (11) per cent sugar and weighing over five (5) pounds.

In 1909, 1910, 1911, and in 1914 the base price was only $4.50 for beets testing 15 per cent. The contracts for these years had the same reservation for beets testing under 11 per cent as that quoted above.

CONTRACTS IN 1915.—In some sections the contracts offered the farmers in 1915 differed considerably from those adopted in any previous year. In other sections they were substantially the same.

In Montana and northern Colorado the 1915 contracts were the same as those entered into in 1913 and those made effective in 1914.

Practically all the factories operating in Michigan adopted a flat rate of $6 per ton in 1915. This was quite an advance over the contract price paid in that State in 1914 and considerably higher than was paid in any year prior to that time except for beets that tested above 16 per cent.

In Utah and Idaho contracts in 1915 generally provided for $5 per ton for beets testing 15 per cent and a deduction of 25 cents per ton for each per cent of sugar less than 15. Some of these contracts, however, provided that the price for all beets testing not below 12 per cent should be $4.75.

A significant clause was found in the 1915 contracts offered by the companies operating in Ohio and some companies operating in California. The companies in Ohio offered a flat price of $5 per ton for beets delivered at the railroad station, with the provision that if the average price of beet sugar exceeded $5 per 100 pounds the grower would receive as additional compensation per ton of beets the difference between $5 and the average price of sugar. Thus, if the average price of beet sugar per 100 pounds should be $5.75, then the price of beets would be $5.75. Some of the Wisconsin factories entered into similar contracts. In California the contracts of some of the factories provided for $4.50 for 15 per cent beets plus 30 cents for each additional per cent, or a deduction of 25 cents for each per cent below 15, and a bonus of 50 cents per ton if the average net selling price of sugar exceeded 4½ cents per pound. At one of the factories in Nebraska a bonus of 50 cents per ton was offered if all the growers together delivered more than 135,000 tons of beets.

In general, contracts in the Lake States and in California were more favorable than those adopted in any previous year.

APPARENT INCONSISTENCIES IN CONTRACTS.—An analysis of these contract prices discloses points of apparent unfairness. The flat rates do not take into account the sugar content above a stated minimum. Thus, for example, if a contract to pay a certain price per ton for beets having a sugar content of 12 per cent is a fair one, that price is manifestly unfair to farmers whose beets test more than 12 per cent and who are paid no more. That the flat rate contract is unfair is recognized by the extent to which manufacturers have adopted a sliding scale of prices graduated according to the sugar content.

The sliding scale contracts, however, are not free from inconsistencies. For example, if $4.50 is a fair price for 12 per cent beets then each additional per cent of sugar should be worth at least 37½ cents. And so, if 12 per cent beets are worth $5 per ton then each additional per cent of sugar should be worth at least 41⅔ cents. No manufacturer in the United States pays as high a price as this for additional sugar in the beet. As a matter of fact each additional per cent of sugar above 12 per cent is worth more relatively than each per cent below 12. Experience shows that a greater percentage of the sugar content is extracted from high-grade beets than from low-grade beets. These apparent inconsistencies were pointed out to an official of one of the large sugar companies, who is one of the best informed men on this subject in the country. He stated that the inconsistencies referred to were not merely apparent but real. As a matter of fact, according to this official, $5 per ton is too high a price for beets testing only 12 per cent. He stated that the experience of his company had been that 16 per cent beets were worth

upon an average about $5.75 per ton, or 36 cents for each per cent of sugar. The reason stated for the relatively high price for low-grade beets is that the farmers insist upon a guaranty of a fairly high minimum price. In other words, the farmers in some communities will not grow beets at all unless they can have a guaranty of at least $5 per ton. When the minimum price is too high, the manufacturer protects himself by adopting a lower price for the additional sugar.

If it is assumed, as stated by the authority above referred to, that in beets testing 16 per cent, each per cent of sugar is worth about 36 cents, then in actual practice the apparent inconsistencies in the contracts are partially overcome. The factories operating in Colorado have paid during the 5 years ending with the compaign of 1914 almost exactly 36 cents for each per cent of sugar in the beets as they enter the factory. The percentage of sugar in the beets when introduced into the factory is somewhat lower than the percentage shown when they are tested at the receiving stations. The average sugar content of the beets entering the factories in the State of Colorado for 5 years was a little less than 15½ per cent and the average price paid the farmer for this sugar was almost exactly 36 cents for each per cent of sugar shown in the factory test. In Montana the discrepancy was greater, the price paid for 17 per cent beets being about 34 cents for each per cent of sugar. In Utah and Idaho the price was considerably lower, being only about 30 cents for each per cent of sugar. In California the average was about the same as in Utah and Idaho. In the Lake States the average price was higher. There it was approximately 40 cents for each per cent of sugar.

Beside the inconsistencies in the contracts themselves there is a striking contrast between the contracts in various beet-growing sections. Thus, the Michigan manufacturer will pay $4.50 for 12 per cent beets, whereas most of the manufacturers in Colorado will pay $5 for beets of the same sugar content. In Utah some of the contracts allow only $5 flat for 15 per cent beets. In other words, they allow 33⅓ cents for each per cent of sugar in 15 per cent beets, but if the beets should test 18 per cent they will still take them at $5 per ton. The payment of a different price in different sections may be justified by distance from consuming markets or possibly for some other reason, but there is no apparent justification for different prices in the same community by the same company.

From the standpoint of those who insist upon encouraging the extension of the industry in new and untried localities some of the inequalities just pointed out may be justified. It is certainly true that capital can not be expected to venture into beet-sugar manufacturing unless there is an assurance of a supply of beets. It is probably

true that farmers would not agree to grow beets unless they were guaranteed a remunerative price for their product, even though the quality might not warrant it. Under such circumstances differences in price not justified by the quality of beets may be necessary to promote the industry in new fields, but their continuation after the quality of the beets has been improved from experience in growing them can not be justified. The maintenance of such a system results in the farmer who grows low-grade beets being paid more than they are worth, while the grower of high-grade beets is paid less.

Section 3. The test of a fair price for beets.

The beet grower often complains that he does not receive a fair price for his beets. The sugar manufacturer replies that the farmer makes as much or more money on his beets as he does on any other crop. This is probably, in the main, true. The farmer rejoins with the assertion that the manufacturer makes large profits extracting sugar from beets and that he can afford to pay more for them than he does pay. This also is sometimes true. It is thus seen that the manufacturer applies one test as to the fairness of the price and the beet grower applies another. The contention of the grower that the large profits of the manufacturer would often enable him to pay a higher price than he does pay implies the idea of cooperation. If the profits of a manufacturer are a fair criterion for the establishment of the price of beets, then the grower should be willing always to accept a price low enough to enable the manufacturer to realize a profit. In other words, on this basis of establishing the price of beets, when the sugar business is prosperous the beet grower would receive a high price, and when it is not prosperous he would receive a low price. If this system of determining prices had been employed in the past the farmers supplying a number of factories would have received a very much lower price for beets than they have received. On the other hand, the farmers in the vicinity of other factories would have received a very much higher price. Some factories have never made much money and have often lost large sums. If the farmers had shared these losses, the results of their beet-growing operations would have been disastrous.

With a fixed price for beets the intelligent, industrious farmer is generally assured a fair return for his efforts. As soon as he harvests his beets he knows precisely what he has made. This advantage of certainty is unquestionably worth considering. If the price of beets depended absolutely upon the vicissitudes of the sugar market it is doubtful whether any considerable number of farmers would be willing to engage in this branch of agriculture. Upon the whole, therefore, it would seem that the principle involved in

the present system of determining prices of beets is the more advantageous to the beet grower. This system, however, might be more equitable by basing the fixed price more nearly upon the sugar content and purity of beets. The sugar manufacturer knows the relative value of beets of different tests, and he should be willing to pay a price that will place all farmers upon an equal basis. It is manifestly inequitable to fix a flat price for beets based upon a range of sugar content embracing as much as 2 or 3 per cent. If the farmer who grows 12 per cent beets is entitled to a given amount, say $4.50 per ton, then beets testing 13, 14, or 15 per cent are worth proportionally more and should be paid for on that basis. On the other hand, if the base price is fixed on a sugar content of, say, 15 per cent, then the farmer's beets which test below this are not worth as much as the basis price and he should not expect to receive that price for them.

THE REASONABLENESS OF BASING THE PRICE OF BEETS UPON THE PRICE OF SUGAR.—As already pointed out, the terms of some beet contracts made in 1915 provided for a minimum price for beets and an addition to that price in case the price of sugar should be above a certain figure. Such a basis for determining the price of beets deserves careful consideration. The fixing of the price of a raw material a year in advance of the time when the value of the manufactured product can be determined involves considerable speculative risk.

If it is practicable to base the price of beets upon the price of sugar, such a system would appear to be entirely reasonable and fair. Under such circumstances the beet grower would be assured of all his beets are worth, and the manufacturer would in no case be compelled to pay more than the price of sugar would warrant. It would seem much more reasonable to determine the price of beets upon this basis than upon the basis of the profits of the manufacturer. It is realized that there would be some difficulty in determining the proper relation between the price of sugar in the beet and the manufactured product If the price of beets could be determined upon some such basis, it would at least tend to eliminate the controversies that are now so frequent between the beet growers and beet sugar manufacturers with respect to the price of beets. Whether determining prices for beets on such a basis would discourage their cultivation is a question which only experience could answer.

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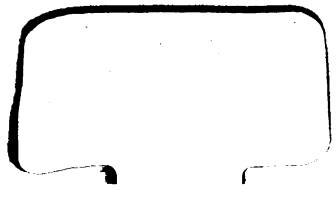
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